Detailed Syllabus
Lecture-wise Breakup

Course Code	17B1NHS531	**Semester ODD (specify Odd/Even)**	**Semester 5 Session** 2018 -2019 **Month from July 2018-Dec2018**
Course Name	Technology and Culture		
Credits	3	**Contact Hours**	(2-1-0)

Faculty (Names)	**Coordinator(s)**	Dr Swati Sharma
	Teacher(s) (Alphabetically)	Dr Swati Sharma

CO Code	COURSE OUTCOMES	COGNITIVE LEVELS
C303-5.1	Understand and apply the main theories in cultural management,	Applying (C4)
C303-5.2	Identify technological convergence and cultural divergence, relate the differences to the literature and suggest solutions	Evaluating(C 5)
C303-5.3	Interpret and communicate effectively in physical and virtual teams by choosing appropriate concepts, logic and selecting the apt IT tools.	Analyzing(C4)
C303-5.4	Application of the theoretical knowledge to adapt to cultural differences in global work environment.	Evaluating(C 5)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction	▪ Genealogy of the concept ▪ The Information Technology Revolution ▪ The concept of Network societies	5
2.	Dimensions of Culture	▪ Evolution of Culture ▪ Principal theories of Culture: Kluckholn and Strodtbeck, Hofstede, Trompenaars and Schwartz ▪ Cultural Diversity and cross cultural literacy	8
3.	Cross cultural communication in physical and virtual teams	▪ The Communication Process ▪ Language and Culture ▪ Non Verbal Communication ▪ Barriers to Cross Cultural Understanding ▪ Marketing and Culture	8
4.	Negotiation and Decision Making	▪ Theories of Negotiation ▪ Negotiation and Intercultural Communication ▪ Decision making in cross cultural environment	2
5.	Cross Culture and Leadership	▪ Leadership and Culture ▪ Theories of Culture centric leadership and their Global Relevance ▪ Developing Competencies for Global citizens ▪ Women as International Leaders	5

		▪ Cross Cultural Training ▪ Ethical Guidelines for Global Citizens	
		Total number of Lectures	**28**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Project, and Oral Viva)
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.	Maidenhead.Riding the Waves of Culture: Understanding Cultural Diversity in Business (2012).3rd edition. McGraw Hill.
2.	Edgar, Andrew and Peter Sedgwick (eds.) Key concepts in Cultural Theory. London. Routledge.1999
3.	Gerard Bannon, J. (red.). Mattock, Cross-cultural Communication: The Essential Guide to International Business.2003
4.	Grossberg, L., C. Nelson and P. Treichler (eds.) Cultural Studies. London. 1992
5.	Robertson, Ronald. Globalization: Social theory and global culture, London: Sage, 1992.

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NHS532	**Semester:** Odd	**Semester V Session** 2018-2019 **Month from:** July 2018 –Dec 2018
Course Name	Planning and Economic Development		
Credits	03	**Contact Hours**	2-1-0

Faculty (Names)	**Coordinator(s)**	Dr. Amba Agarwal (JIIT-128), Dr. Monica Chaudhary (JIIT-62)
	Teacher(s) (Alphabetically)	Dr. Amba Agarwal, Dr. Monica Chaudhary, Mr. Manas R. Behera

COURSE OUTCOMES		**COGNITIVE LEVELS**
After pursuing the above mentioned course, the students will be able to:		
C303-4.1	Understand the issues and approaches to economic development.	Understanding Level (C2)
C303-4.2	Evaluate National income accounting, human development index and sustainable development.	Evaluating Level (C5)
C303-4.3	Apply an analytical framework to understand the structural characteristics of development.	Applying Level (3)
C303-4.4	Analyze the role of Macroeconomic stability & policies and Inflation in the development process.	Analyzing Level (C4)
C303-4.5	Evaluate the importance of federal development and decentralization.	Evaluating Level (C5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Economic Development and its Determinants	Economic growth and development. Indicators of development. Rostows Stages of Growth. Approaches to economic development.	2
2.	National Income Accounting	National Income Accounting, Green GNP and Sustainable development	4
3.	Indicators of development	PQLI, Human Development Index (HDI) and gender development indices.	3
4.	Demographic Features, Poverty and Inequality	Demographic features of Indian population; Rural-urban migration; Growth of Primary, Secondary and Tertiary Sector.	3
5.	Inflation and Business Cycles	Inflation. Business cycle. Multiplier and Accelerator Interaction.	4
6.	Macro Economic Stability & Policies	Monetary Policy. Fiscal Policy. Role of Central Bank & Commercial banks in the development of the country. Balance of payments; currency convertibility and Issues in export-import policy.	5
7.	Federal Development	The Federal Set-up - The Financial Issues in a Federal Set-up, Principles for Efficient Division of Financial Resources between Governments. Financial Federalism under Constitution. Finance Commissions in India, Terms of References and its Recommendations	4
8.	Planning and Development	Need for planning-Niti Aayog, Decentralisation, Rural and Urban local bodies.	3
Total number of Lectures			28

Evaluation Criteria	
Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignment, Viva & Attendance)
Total	**100**

Recommended Reading material:	
1.	**Meier, G.M.,** Leading Issues in Economic Development, Oxford University Press, New Delhi, 1970
2.	**Todaro, M.P**., **Stephen C. Smith,** Economic Development, Pearson Education, 2017
3.	**Thirwal, A.P**., Economics of Development, Palgrave, 2011
4.	**Ghatak, S.,** An Introduction to Development Economics, Allen and Unwin, London, 1973
5.	**Ahuja, H. L.**, Development Economics, S Chand publishing, 2016

Detailed Syllabus
Lecture-wise Breakup

Course Code	17B1NHS533	Semester: Odd	Semester V Session 2018 -2019 Month from: July 2018 to Dec. 2018
Course Name	Marketing Management		
Credits	3	Contact Hours	2-1-0

Faculty (Names)	Coordinator(s)	Dr. Deepak Verma
	Teacher(s) (Alphabetically)	Dr. Deepak Verma

COURSE OUTCOMES: After pursuing the above mentioned course, student will be able to:		COGNITIVE LEVELS
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)
C305-7.5	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 Marketing**	Defining 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 Marketing Process.	5

4	**Consumer and Business Buyer Behavior**	Consumer Markets and consumer buyer behavior. The buying decision process. Business Markets and business buyer behavior. Discuss the modern ethical standards.	5
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	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Project, Assignment and Verbal 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.	Kotler, Philip and Gary Armstrong, Principles of Marketing, 17th Edition, New Delhi, Pearson Education, 2017.
2.	Kotler, Philip., and Kevin Lane Keller, Marketing Management, 15th Edition, New Delhi, Pearson Education, 2014.
3.	Grewal D., &Levy Michael, Marketing, 5th Edition, Mc graw Hill Education (India) Private Limited 2017.
4.	Winer, Russell S ., Marketing Management, 4th Edition, Prentice Hall,2014.

Detailed Syllabus
Lecture-wise Breakup

Subject Code	**16B1NHS536**	**Semester: ODD (specify Odd/Even)**	**Semester: V Session: 2018-2019 Month: JULY-DECEMBER**
Subject Name	**TECHNOLOGY AND GOVERNANCE**		
Credits	**3**	**Contact Hours**	**(2-1-0)**

Faculty (Names)	**Coordinator(s)**	**Dr. Santosh Dev**
	Teacher(s) (Alphabetically)	**Dr. Santosh Dev**

Co Code	Course Objective	Cognitive Level
C303-3.1	Understand the concepts and processes of governance in Indian context	Understanding (C2)
C303-3.2	Critically appraise the importance of technological intervention in governance	Evaluating (C5)
C303-3.3	Examine and appraise Digital India campaign and design solution	Creating (C6)
C303-3.4	Design technological intervention to solve society problems	Creating (C6

Module No.	Subtitle of the Module	Topics in the module	No. of Lectures for the module
1.	Introduction to the Course	What is Governance? General Introduction about the importance and usability	3
2.	Relation of Technology and Governance	The beginnings of technology Technology and society Technology and culture Technology and Economy Technology and Individual	4
3.	How Information Technology and the Internet Have Changed the World;	Development of technology and globalization	3
4.	E-Frameworks	A Framework for E-Government: E-Government Principals, E-Services, E-Democracy, E-Management; Strategic Planning	5
5	Digital India	What is Digital India?DeitY, Vision of Digital India, Nine Pillars of Digital India, Institutional Mechanisms at National Level, Composition of Monitoring Committee on Digital India, Challenges & Changes Needed	5
6	Governance Models	Collaborative Governance Model,	

		Good Governance Model	2
7.	Different Uses and the Governance Analytical Framework	Governance as Process, Public Governance, Private Governance, Global Governance, Non Profit Governance, Corporate Governance.	4
8.	Different Uses and the Governance Analytical Framework	Project Governance, Environmental Governance, Internet Governance, Information Technology Governance, Regulatory Governance, Participatory Governance, Multilevel Governance, Meta-Governance and Collaborative Governance.	2
		Total number of Lectures	28

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.	Mark Bevir, *Governance: A very short introduction.*, Oxford University Press Oxford, UK (2013)
2.	Research Papers: Alexandra Mateescu, Alex Rosenblat and danah boyd, Policy Body-Worn Cameras http://www.datasociety.net/pubs/dcr/PoliceBodyWornCameras.pdf, February 2015. Fung, Archon; Graham Mary, Weil David, Full Disclosure: The Perils and Promise of Transparency, 2008. Gurstein, M. B.,Open data: Empowering the empowered or effective data use for everyone? First Monday, (2011) 16(2) Veeraraghavan, Rajesh, Introduction & Conclusion in Open Governance and Surveillance: A Study of the National Rural Employment Guarantee Program in Andhra Pradesh, India. (2015). Li, Tania, The Will to Improve: Governmentality, Development, and the Practice of Politics. 2007 Benjamin, S., Bhuvaneswari, R., & Rajan, P., Bhoomi : ' E-Governance ', Or , An Anti-Politics Machine Necessary to Globalize Bangalore ? (2007). (January), 1-53.

Detailed Syllabus
Lecture-wise Breakup

Subject Code	18B12HS311	**Semester ODD**	**Semester** 5 **Session** 2018-19 **Month from** July 2018 to December 2018
Subject Name	STRATEGIC HUMAN RESOURCE MANAGEMENT		
Credits	3	**Contact Hours**	2-1-0
Faculty (Names)	**Coordinator(s)**	Praveen Sharma (Sec-128), Santoshi Sengupta (Sec-62)	
	Teacher(s) (Alphabetically)	Praveen Sharma, Santoshi Sengupta	

COURSE OUTCOMES		**COGNITIVE LEVELS**
C303-6.1	Understand human resource management from a strategic perspective and analyze environmental challenges that impact HRM of an organization	Analyze Level (C4)
C303-6.2	Assess the human resource needs of the organization and design recruitment and selection strategies for an organization	Evaluate Level (C5)
C303-6.3	Evaluate the processes of training and development, mentoring, performance management, compensation and reward management in an organization and design effective strategies for the same	Evaluate Level (C5)
C303-6.4	Critically assess career management system, work-life initiatives and other HRM practices of the organization	Evaluate Level (C5)

Module No.	**Subtitle of the Module**	**Topics in the module**	**No. of Hours for the module**
1.	Introduction	Role of HR in strategy; Evolution of SHRM; Strategic fit: Conceptual Framework; Theoretical Perspectives on SHRM; SHRM approaches in Indian context	4
2.	Strategic Human Resource Environment and Evaluation	Overview of the environment; SHRM in Knowledge Economy; HRM and Firm Performance; Rationale for HR Evaluation; Approaches to HR Evaluation	4
3.	Strategic Human Resource Planning and Acquiring	Overview of HRP; Objectives of HRP; Job Analysis and SHRM; External and Internal Influences on Staffing; Recruitment: Sources, Methods and Approaches; Selection: Methods and Approaches; Strategic Recruitment and Selection	6
4.	Training, Development, Mentor Relationships	Basic Concepts, Purposes & Significance of Training and Development; HRM Approaches; Linkage between Business Strategy and training; Process; new Developments; Concept and outcomes of mentoring; Strategic approach of Mentoring relationships	4
5.	Strategic Performance Management; Compensations and Reward Management; Career Management	Developing performance management systems; Technology and performance management; Strategic Linkage of performance management; Determinants and approaches of compensation and rewards; New Developments; Business Strategy and compensation; Career Management systems; SHRM approach to career management	6
6.	Work Life Integration and International HRM	HRD Approaches to work-life integration; Development of work-life initiatives; Strategic approach to work-life integration; External HRM; IHRM practices	4
Total number of Lectures			28

Evaluation Criteria	
Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Projects -Report and Viva, 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.	Tanuja Agarwala, Strategic Human Resource Management, 1st edition, Oxford University Press, 2007
2.	Stephen J. Perkins, Susan M. Shortland, Strategic International Human Resource Management: Choices and Consequences, Kogan Page, 2010
3.	John storey, Patrick Wright and Dave Ulrich, Strategic Human Resource Management, Routledge Taylor and Francis Group, 2009

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B1NHS434	**Semester:** Odd	**Semester** V **Session** 2018 -2019 **Month from** July 2018 to December 2018
Course Name	PRINCIPLES OF MANAGEMENT		
Credits	**3**	**Contact Hours**	2-1-0

Faculty (Names)	**Coordinator(s)**	Dr. Shirin Alavi (Sector 62) and Dr. Ruchi Gautam (Sector 128)
	Teacher(s) (Alphabetically)	Dr. Praveen Sharma , Dr. Ruchi Gautam and Dr. Shirin Alavi

COURSE OUTCOMES		**COGNITIVE LEVELS**
C303-1.1	Describe the functions, roles and skills of managers and illustrate how the manager's job is evolving.	Understanding Level (C2)
C303-1.2	Examine the relevance of the political, legal, ethical, economic and cultural environments in global business.	Analyzing Level (C4)
C303-1.3	Evaluate approaches to goal setting, planning and organizing in a variety of circumstances.	Evaluating Level (C5)
C303-1.4	Evaluate contemporary approaches for staffing and leading in an organization.	Evaluating Level (C5)
C303-1.5	Analyze contemporary issues in controlling for measuring organizational performance.	Analyzing Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction to Managers and Management	Management an Overview: Introduction, Definition of Management, Role of Management, Functions of Managers, Levels of Management, Management Skills and Organizational Hierarchy, Social and Ethical Responsibilities of Management: Arguments for and against Social Responsibilities of Business, Social Stakeholders, Measuring Social Responsiveness and Managerial Ethics, Omnipotent and Symbolic View, Characteristics and importance of organizational culture, Relevance of political, legal, economic and Cultural environments to global business, Structures and techniques organizations use as they go international .	7
2.	Planning	Nature & Purpose, Steps involved in Planning, Objectives, Setting Objectives, Process of Managing by Objectives, Strategies, Policies & Planning Premises, Competitor Intelligence, Benchmarking, Forecasting, Decision-Making.	5
3.	Organizing	Nature and Purpose, Formal and Informal Organization, Organization Chart, Structure and Process, Departmentalization by difference strategies, Line and Staff authority- Benefits and Limitations-De-Centralization and Delegation of Authority Versus, Staffing, Managerial Effectiveness.	7
4.	Directing	Scope, Human Factors, Creativity and Innovation, Harmonizing Objectives, Leadership, Types of Leadership	4

		Motivation, Hierarchy of Needs, Motivation theories, Motivational Techniques, Job Enrichment, Communication, Process of Communication, Barriers and Breakdown, Effective Communication, Electronic media in Communication.	
5.	Controlling	System and process of Controlling, Requirements for effective control, The Budget as Control Technique, Information Technology in Controlling, Productivity, Problems and Management, Control of Overall Performance, Direct and Preventive Control, Reporting, The Global Environment, Globalization and Liberalization, International Management and Global theory of Management.	5
		Total number of Lectures	**28**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Project: Report & Viva)
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.	Robbins, S.P. & Coulter, Mary, Management, 14th ed., Pearson , 2009
2.	Robbins, S.P. & Decenzo, David A., Fundamentals of Management, 7th ed., Pearson, 2010
3.	Principles of Management Text and Cases, Pravin Durai, Pearson ,2015

Detailed Syllabus
Lecture-wise Breakup

Course Code	**16B1NHS 531**	**Semester : Odd (specify Odd/Even)**	**Semester : v Session:2018 -2019 Month from: July to December**
Course Name	**Sociology of Youth**		
Credits	**3**	**Contact Hours**	**(2-1-0)**

Faculty (Names)	**Coordinator(s)**	**Prof Alka Sharma**
	Teacher(s) (Alphabetically)	**Prof Alka Sharma** **Ms Shikha**

CO Code	COURSE OUTCOMES	COGNITIVE LEVELS
C303-2.1	Understand youth and youth culture in sociological perspectives	Understanding(C 2)
C303-2.2	Appraise the ethical, cultural& social issues concerning Youth	Evaluating(C 5)
C303-2.3	Appraise the youth culture and interprets the same	Analyzing(C 5)
C303-2.4	Analyze societal problems related to youth in the evolving society.	Evaluating(C 4)

Module No.	Title of the Module	Topics in the Module	No. of Lectures for the module
1.	Introduction to Youth	Meaning, characteristics, Youth for Development, Challenges faced by Youth, Youth's roles and responsibilities in society	2
2.	Youth Culture	Concept of Youth Culture	2
3.	Perspectives on Youth Culture	Functionalist, Conflict, Interactionist and Feminist Perspective on Youth Culture, Youth and Gender	3
4.	Youth Development	Principles of Youth Development, Learning theory, Constructivist theory, collaborative learning , Relationships theories, Theories as a tool to understand Youth Culture	6
5.	Socialization of Youth	Role of family, Community, religion, kin and neighborhood, Changing social structures in family, marriage, Youth and changing identities	6
6.	Emerging problems of Youth	Role and Value conflicts, Generation Gap, Career decisions and Unemployment, Emotional adjustment, Coping with pressures of living, Unequal Gender norms, Crime (Social Strain theories),	6
7.	Changing perceptive of Youth and Youth Culture in 21st century	Role of popular culture and social media, involvement of youth in major decision making institutions, Post-modernity and Youth	3
			…
		Total number of Lectures	**28**

Evaluation Criteria	
Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Project, Presentation, Assignment and attendance)
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.	Tyyskä, V. *Youth and Society: The long and winding road*, 2nd Ed., Canadian Scholars' Press, Inc. (2008).
2.	White, Rob, Johanna Wyn and Patrizia Albanese. *Youth & Society: Exploring the Social Dynamics of Youth Experience.* Don Mills, ON: Oxford University Press. (2011).
3.	Bansal, P.*Youth in contemporary India: Images of identity and social change*. Springer Science & Business Media. (2012).
4.	Furlong, Andy. *Youth studies: An introduction*. Routledge, (2012).
5.	Blossfeld, Hans-Peter, et al., eds. *Globalization, uncertainty and youth in society: The losers in a globalizing world*. Routledge, (2006).

Detailed Syllabus
Lecture-wise Breakup

Course Code	**18B12HS612**	**Semester : Odd**	**Semester: V Session: 2018-19** **Month: JULY-DECEMBER**
Course Name	**Indian Polity and Constitutional Democracy in India.**		
Credits	**3**	**Contact Hours**	**(2-1-0)**

Faculty (Names)	**Coordinator(s)**	Dr. Chandrima Chaudhuri
	Teacher(s) (Alphabetically)	Dr. Chandrima Chaudhuri

CO Codes	**COURSE OUTCOMES**	**COGNITIVE LEVELS**
C303-7.1	Explain the importance of Polity and Constitution.	Understand(C2)
C303-7.2	Interpret the Fundamental Rights and Duties.	Understand (C2)
C303-7.3	Analyze the unity in diversity concept of our Nation	Analyze(C4)
C303-7.4	Analyze various concepts useful to understand the system of governance	Analyze(C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	The Constituent Assembly and the Constitution.	The formation of the Constituent Assembly; the philosophy of the Constitution and its main features. Fundamental Rights and Directive Principles. Concept of Power and Politics Concept of Nation- State	8
2.	Federalism and Decentralization	Centre - state relations; Constitutional provisions regarding emergency and centre-state relations Special provisions for some states and the fifth and sixth schedule areas Third tier of government: Panchayati Raj; urban local bodies Regionalism Ethnicity Globalizations. Gender and Caste	14
3.	Organs of Government	The Legislature: Parliament The Executive: President, Prime Minister and	6

		Governor The Judiciary: The Supreme Court	
		Total number of Lectures	**28**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (5- attendance, 20-quiz)
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.	Austin, G. (1979). *The Constituent Assembly: Microcosm in Action in The Indian Constitution: Cornerstone of a Nation.* New Delhi: Oxford University Press
2.	Bhargava,R. (2008). *Politics and Ethics of the Indian Constitution*. New Delhi: Oxford University Press
3.	Jha, S. (2008). Rights versus Representation: Defending Minority Interests in the Constituent Assembly, in R. Bhargava. (ed.), *Politics and Ethics of the Indian Constitution*, New Delhi: Oxford University Press
4.	Kapur, D.& Mehta, P.B. (ed.) (2005) *Public Institutions in India: Performance and Design*, New Delhi: Oxford University Press
5.	Shankar, B.L., & Rodrigues, V. (2011) *The Indian Parliament: A Democracy at Work*, New Delhi: Oxford University Press
6.	Manor, J. (1994). The Prime Minister and the President, in B.D. Dua, and J. Manor (eds.) *Nehru to the Nineties : The Changing Office of the Prime Minister in India*, Vancouver: University of British Columbia Press

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11EC511	**Semester Odd (specify Odd/Even)**	**Semester** V **Session** 2018 -2019 **Month from** July to December
Course Name	Digital Communication		
Credits	04	**Contact Hours**	3-1-0

Faculty (Names)	**Coordinator(s)**	Dr. Anand Agrawal, Dr. Reema Budhiraja
	Teacher(s) (Alphabetically)	Dr. Ashish Goel, Dr. Anand Agrawal, Dr. Dhermendra Sadhwani, Dr. Megha Agrawal, Ms. Bhawna Gupta, Dr. Richa Gupta

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Understand the concepts of Sampling process, time division multiplexing and GSOP.	Understanding (Level II)
CO2	Understand the concepts of waveform coding techniques, PSD of different line coding schemes and analysis of ISI Mitigation Techniques	Analyzing (Level IV)
CO3	Understand the concepts of digital modulation techniques and evaluate their probability of error and bandwidth efficiency.	Evaluating (Level V)
CO4	Understand the concepts of error control coding schemes.	Understanding (Level II)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Merits and demerits of digital signals, sampling theorem in frequency domain and time domain, Nyquist criteria, reconstruction using interpolation filters, ideal, natural and flat top sampling, aperture effect	8
2.	Waveform coding techniques	PCM generation and detection, quantization, quantization error, non uniform quantization, companding, differential PCM, Delta modulation, Adaptive delta modulation, Data encoding formats, PSD of Line codes, ISI, ISI Mitigation Techniques. GSOP.	8
3.	Digital Modulation Techniques	Binary & M-ary modulation techniques: FSK, PSK, DPSK, M-ary PSK, Minimum Phase Shift Keying (MSK) and Quadrature Amplitude Modulation	10
4.	Performance Analysis of Digital Systems	Probability of error analysis – Optimum filter, Matched filter, Coherent & Non – Coherent Reception, Probability of error for FSK, PSK, DPSK, M-ary PSK, Minimum Phase Shift Keying (MSK). Introduction to bit Vs symbol error probability & Bandwidth	10
5.	Digital Systems and error control	Digital radio, Plesiochronous and Digital Synchronous Hierarchy standards, introduction to error control	6

Total number of Lectures	**40**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25
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.	S. Haykin, Digital Communications, John Wiley & Sons, 2001.
2.	H. Taub & D. L. Schilling, Principles of Communication Systems, 2nd edition, McGraw-Hill Higher Education
3.	A. Bhattacharya, Digital Communication, 1st edition, TMH, 2006.
4.	B. Sklar, Digital Communications Fundamentals & Applications, 2nd edition, Pearson Education, 2007.

Detailed Syllabus

Lecture-wise Breakup

Course Code	17B1NMA531	**Semester** - Odd		**Semester** V **Session** 2018 -2019 **Month from** July 2018 - Dec 2018	
Course Name	Basic Numerical Methods				
Credits	4		**Contact Hours**	3-1-0	
Faculty (Names)	**Coordinator(s)**	Dr. Yogesh Gupta			
	Teacher(s) (Alphabetically)	Dr. Puneet Rana Dr. Yogesh Gupta			

COURSE OUTCOMES		**COGNITIVE LEVELS**
After pursuing the above mentioned course, the students will be able to:		
C301-5.1	explain the concepts of approximation and errors in computation.	Understanding level (C2)
C301-5.2	construct numerical methods for algebraic and transcendental equations and their convergence.	Applying Level (C3)
C301-5.3	outline the methods of interpolation using finite differences and divided difference formulas.	Understanding level (C2)
C301-5.4	make use of numerical differentiation and integration.	Applying Level (C3)
C301-5.5	solve the system of linear equations using direct and iterative methods.	Applying Level (C3)
C301-5.6	solve ordinary differential equations using different numerical methods.	Applying Level (C3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Approximation and Errors in Computation	Errors, relative error, absolute error, order of approximation.	02
2.	Algebraic and Transcendental Equations	Bisection Method, Regula- Falsi Method, Secant Method, Iterative method, Newton-Raphson Method, , convergence, Horner's method	07
3.	Interpolation	Finite Differences, Relation between difference operators, Newton's Forward and Backward Interpolation, Gauss Backward Interpolation, Bessel's and Sterling's central difference operators, Laplace-Everett's formula, Newton's divided difference formula	08
4.	Numerical Differentiation and Integration	Derivatives using Newton's Forward and Backward Interpolation, Bessel's and Sterling's central difference operators, Maxima and minima of a tabulated function. Boole's and Weddle's rule, Romberg's method, Euler-Maclaurin formula, Gaussian Integration.	11
5.	System of Equations	Gauss Elimination method, Given's method, Gauss-Seidel Method, House holder's method.	05

6.	Numerical Solution of Ordinary Differential Equations	Picard's method, Euler's method, Modified Euler's method, Fourth order Runge-Kutta method, Milne's method for fixed order, second order and simultaneous differential equations, Finite-Difference Method	09
Total number of Lectures			**42**

Evaluation Criteria	
Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz, Assignments, and 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.	**C. F. Gerald and P. O. Wheatley,** Applied Numerical Analysis, 6th Ed., Pearson Education, 1999.
2.	**M.K. Jain, S.R.K. Iyengar and R. K. Jain,** Numerical Methods for Scientific and Engineering Computation 6th Ed., New Age International, New Delhi, 2014.
3.	**R.S. Gupta,** Elements of Numerical Analysis by 1st Ed., (2009) Macmillan.
4.	**S.D. Conte and C. deBoor,** Elementary Numerical Analysis, An Algorithmic Approach, 3rd Ed., McGraw-Hill, New York, 1980.

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NPH531	**Semester : Odd**	**Semester** V **Session** 2019 -2020 **Month from : July to Dec**
Course Name	**Quantum Mechanics for Engineers**		
Credits	04	**Contact Hours**	**04**

Faculty (Names)	**Coordinator(s)**	Dr. Vikas Malik and Dr. Swati Rawal
	Teacher(s) (Alphabetically)	Dr. Vikas Malik and Dr. Swati Rawal

COURSE OUTCOMES		**COGNITIVE LEVELS**
C301-10.1	Remember basics of Quantum Mechanics and its applications.	Remembering (C1)
C301-10.2	Explain postulates of quantum mechanics, Dirac notation, Schrödinger Equation, Perturbation theory and Qubits.	Understanding (C2)
C301-10.3	Solve various problems related to different quantum systems and construct quantum circuits using quantum gates.	Applying (C3)
C301-10.4	Analyse the results obtained for various physical systems and to establish the advantages of some simple protocols of quantum information processing.	Analyzing (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction	Wave particle duality, quantum physics (Planck and Einstein's ideas of quantized light), postulates of quantum mechanics, time dependent and time independent Schrodinger equation, operators, probability theory, expectation values, and uncertainty principle and its implications, no cloning applications	8
2.	Measurement Theory with Applications	Matrix and linear algebra, Eigen values and eigenfunctions Hilbert space, Kets, Bras and Operators, Bras Kets and Matrix representations, Measurements, Stern Gerlach Experiment, Observables and Uncertainity Relations, No-cloning theorem, Pauli Spin Matrices.	10
3.	Potential problems	1-D, 2-D, and 3-D potential problems (including infinite and finite square well). Tunneling, harmonic oscillator, separation in spherical polar coordinates, hydrogen atom, etc.),	08
4.	Approximation methods	Time independent perturbation theory for nondegenerate and degenerate energy levels.	4
5.	Advanced Applications	Kronig Penny model, Basic ideas of quantum computing, Qubit, Gate model of quantum computing : H, CNOT, Pauli Gates, BB84 protocol, Advantages of quantum computing, Quantum wire, Quantum dot and realization of CNOT using Quantum dot.	10
		Total number of Lectures	**40**

Evaluation Criteria

Components	**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**

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.	The new quantum universe by Toney Hey and Patrick Walters, Cambridge University Press.
2.	Quantum mechanics a new introduction by Kenichi Konishi and G Paffuti, OUP., 2009
3.	Quantum physics by Eyvind H Wichman (Berley Physics course Vol 4) Tata McGraw Hill 2008
4.	Elements of quantum computation and quantum communication by A Pathak, CRC Press 2013.
5.	Introduction to Quantum Mechanics by David J. Griffiths, Second Edition, Pearson, 2015.

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NPH532	**Semester**: ODD	**Semester: V Session** 2018 -2019 **Month: July-Dec**
Course Name	Materials Science		
Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Dr. Manoj Kumar and Dr. Sandeep Chhoker
	Teacher(s) (Alphabetically)	Dr. Manoj Kumar and Dr. Sandeep Chhoker

COURSE OUTCOMES		**COGNITIVE LEVELS**
C301-11.1	Recall variety of engineering materials for their applications in contemporary devices	Remembering (C1)
C301-11.2	Explain dielectric, optical, magnetic, superconducting, polymer and thermoelectric properties	Understanding (C2)
C301-11.3	Apply properties of dielectric, optical, magnetic, superconducting, polymer and thermoelectric materials to solve related problems	Applying (C3)
C301-11.5	Prove and estimate solution of numerical problems using physical and mathematical concepts involved with various materials	Evaluating (C5)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Dielectric Materials	Polarization mechanism & Dielectric Constant, Behavior of polarization under impulse and frequency switching, Dielectric loss, Spontaneous polarization, Ferroelectrics, Piezoelectric effect; Applications of Dielectric Materials	10
2.	Magnetic Materials	Concept of magnetism, Classification – dia-, para-, ferro-, antiferro- and ferri-magnetic materials, Their properties and Applications; Hysteresis; Magnetic Storage and Surfaces.	**10**
3.	Super conducting Materials	Meissner effect, Critical field, type-I and type-II superconductors; Field penetration and London equation; BCS Theory, High temperature Superconductors and their Applications	**5**
4.	Polymers and Ceramics	Various types of Polymers and their applications; Mechanical behavior of Polymers, synthesis of polymers; Structure, Types, Properties and Applications of Ceramics; Mechanical behavior and Processing of Ceramics.	**6**
5.	Optical Materials	Basic Concepts, Light interactions with solids, Optical properties of nonmetals: refraction, reflection, absorption, Beer-Lambert law, transmission, Photoconductivity. Drude Model, relation between refractive index and relative dielectric constant, Optical absorption in metals, insulators and semiconductors. Introduction to Photonic band gap (PBG) materials and its applications	**6**

6.	Thermoelectric Materials	Thermoelectric (TE) effects and coefficients (Seebeck, Peltier, Thompson); TE materials and devices, Heat conduction, Cooling, Figure of Merit; TE power generation (efficiency), refrigeration (COP), Examples and applications.	**3**
		Total number of Lectures	**40**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 [2 Quiz (10), Attend. (10) and Class performance (5)]
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.	S.O. Pillai, Solid State Physics, New Age International Publishers.
2.	B. B. Laud, Laser and Non-linear Optics, John Wiley & Sons
3.	Van Vlack, Elements of Material Science and Engineering, Pearson Education.
4.	Srivastava and Srinivasan, Material Science and Engineering,
5	W.D. Callister Jr., Material Science and Engineering: An Introduction, John Wiley.

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NPH533	**Semester Odd**	**Semester V Session** 2018 -2019 **Month from** July to December
Course Name	Laser Technology and Applications		
Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Navneet Kumar Sharma and Amit Verma
	Teacher(s) (Alphabetically)	Navneet Kumar Sharma and Amit Verma

COURSE OUTCOMES		**COGNITIVE LEVELS**
C301-12.1	Define the coherent properties, high brightness of laser, population inversion and optical feedback to laser technology	Remember Level (C1)
C301-12.2	Extend the knowledge of lasers in some applications like LIDAR, laser tracking, bar code scanner, lasers in medicine and lasers in industry	Understand Level (C2)
C301-12.3	Apply the optical ray transfer matrix to determine the stability of a laser resonator	Apply Level (C3)
C301-12.4	Distinguish the operational principles of CW, Q-switched, mode locked lasers; laser rate equations for three & four level lasers; different types of laser systems	Analyze Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Fundamentals of Lasers	Laser idea and properties; Monochromaticity, directionality, brightness, Temporal and spatial Coherence. Interaction of radiation with matter; Absorption, spontaneous and stimulated emission of radiation, Rates equations, Einstein's A and B coefficients. Laser rate equations: Four level and three level systems. Conditions for producing laser action, population inversion, saturation intensity, threshold condition and gain optimization. Experimental techniques to characterize laser beam.	12
2.	Types of Lasers	Pumping processes; optical and electrical pumping. Optical Resonators; The quality factor, transverse and longitudinal mode selection; Q switching and Mode locking in lasers. Confocal, planar and spherical resonator systems. Types of Lasers; Solid state Lasers; Ruby Laser, Nd:YAG laser. Gas lasers; He-Ne laser, Argon laser, CO_2, N_2 and Excimer Laser. Dye (liquid) Laser, Chemical laser (HF), Semiconductor Lasers; Heterostructure Lasers, Quantum well Lasers. Free electron laser, X-ray laser and Ultrafast Laser.	16
3.	Applications of Lasers	Image processing; Spatial frequency filtering and Holography, Laser induced fusion; Fusion reactor, creation of Plasma. Lightwave communications. Use in optical reader (CD player) and writer. Nonlinear optics; harmonic generation, self focusing. Lasers in industry; Material processing, Cutting, welding and whole drilling. Precision	12

		length measurement, velocity measurement, Laser Tracking, Metrology and LIDAR. Lasers in medicines and surgery. Lasers in defense, Lasers in space sciences, Lasers in sensors.	
		Total number of Lectures	**40**

Evaluation Criteria

Components	**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**

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.	Thyagarajan and Ghatak, *Lasers Theory and Applications*, Macmilan India.
2.	W. T. Silfvast, *Laser Fundmentals*, Cambridge Univ-Press.
3.	O. Svelto, *Principles of Lasers*, Springer.
4.	Saleh and Teich, *Fundamentals of Photonics*, John Wiley & Sons.

Detailed Syllabus
Lecture-wise Breakup

Course Code	16B1NPH535	**Semester** Odd	**Semester** V **Session** 2019 -2020 **Month from:** July-Dec
Course Name	NUCLEAR SCIENCE AND ENGINEERING		
Credits	4	**Contact Hours**	4

Faculty (Names)	**Coordinator(s)**	Dr. Vivek Sajal
	Teacher(s) (Alphabetically)	Dr. Vivek Sajal

COURSE OUTCOMES		**COGNITIVE LEVELS**
C301-14.1	Relate terminology and concepts of nuclear science with various natural phenomenon and engineering applications.	Remembering (C1)
C301-14.1	Explain various nuclear phenomenon, nuclear models, mass spectrometers, nuclear detectors, particle accelerators. and classify elementary particles.	Understanding (C2)
C301-14.1	Solve mathematical problems for various nuclear phenomenon and nuclear devices.	Applying (C3)
C301-14.1	Analyze the results obtained for various physical problems and draw inferences from the results.	Analyzing (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Nuclear Constituents and their properties, Nuclear Forces	Rutherford scattering and estimation of nuclear size, Constituents of the nucleus and their properties, Nuclear Spin, Moments and statistics, Magnetic dipole moment, Electric quadruple moment. Nuclear forces, Two body problem - Ground state of deuteron, Central and non-central forces, Exchange forces: Meson theory, Yukawa potential, Nucleon-nucleon scattering, Low energy n-p scattering, Effective range theory, Spin dependence, charge independence and charge symmetry of nuclear forces, Isospin formalism.	07
2.	Nuclear Models	Binding energies of nuclei, Liquid drop model: Semi-empirical mass formula, Mass parabolas, Prediction of Nuclear stability, Bohr-Wheeler theory of fission, Shell model, Spin-orbit coupling. Magic numbers, Angular momenta and parities of nuclear ground state, Magnetic moments and Schmidt lines, Collective model of a nucleus.	05
3.	Nuclear decay and Nuclear reactions	Alpha decay, Beta decay, Pauli's Neutrino hypothesis-Helicity of neutrino, Theory of electron capture, Non-conservation of parity, Fermi's theory, Gamma decay: Internal conversion, Multipole transitions in nuclei, Nuclear isomerism, Artificial radioactivity, Nuclear reactions and conservation laws, Q-value equation, Centre of mass frame in nuclear Physics, Scattering and reaction cross sections, compound nucleus, Breit-Wigner one level formula	08

4.	Interaction of nuclear radiation with matter	Interaction of charge particles with matters: Bohr's ionization loss formula and estimation of charge, mass and energy. Interaction of electromagnetic radiation with matter, Linear absorption coefficient. Nuclear particle detectors and neutron counters.	07
5.	Accelerator and reactor Physics	Different types of reactors, tracer techniques, activation analysis. Radiation induced effects and their applications: Accelerators: Linear accelerators, Van de Graff generator, LINAC, Cyclotrons, Synchrotons, Colliders.	06
6.	Cosmic radiation and Elementary Particles	Cosmic radiation: Discovery of cosmic radiation, its sources and composition, Latitude effect, altitude effect and east-west asymmetry, secondary cosmic rays, cosmic ray shower, variation of cosmic intensity and Van Allen radiation belt. Elementary particles: Classification of particles, K-mesons, Hyperons, particles and antiparticles, fundamental interactions, conservation laws, CPT theorem, resonance particles and hypernucleus, Quark model.	07
		Total number of Lectures	**40**

Evaluation Criteria

Components	**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**

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.	K.S. Krane, 1987, Introductory Nuclear Physics, Wiley, New York.
2.	I. Kaplan, 1989, Nuclear Physics, 2nd Edition, Narosa, New Delhi.
3.	B.L. Cohen, 1971, Concepts of Nuclear Physics, TMH, New Delhi.
4.	R.R. Roy and B.P. Nigam, 1983, Nuclear Physics, New Age International, New Delhi.
5.	H.A. Enge, 1975, Introduction to Nuclear Physics, Addison Wesle, London.
6.	Y.R. Waghmare, 1981, Introductory Nuclear Physics, Oxford-IBH, New Delhi.
7.	R.D. Evans, 1955, Atomic Nucleus, McGraw-Hill, New York.

Detailed Syllabus

Lecture-wise Breakup

Course Code	17B1NMA532	**Semester** Odd **(specify Odd/Even)**	**Semester** V **Session** 2018 -2019 **Month from** July – Dec 2018
Course Name	Computer Based Numerical Techniques		
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 pursuing the above mentioned course, the students will be able to:		
C301-6.1	explain the concepts of approximation and errors in computation.	Understanding Level (C2)
C301-6.2	apply numerical methods for solving algebraic and transcendental equations along with their convergence.	Applying Level (C3)
C301-6.3	apply divided difference, finite difference and splines formulae for numerical interpolation.	Applying Level (C3)
C301-6.4	solve ordinary differential and integral equations using numerical methods.	Applying Level (C3)
C301-6.5	explain the basics of MATLAB software and its applications in finding numerical solutions.	Understanding Level (C2)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Errors in numerical computation and Approximation	Accuracy of numbers, Errors and its types, Error in numerical computations, Error in series approximation, Floating point representation of numbers, Arithmetic operations with normalized floating point representation of numbers, Machine computation, Synthetic division of a polynomial, Diminish of the root of equation by a constant value, Horner's method to find positive root, Evaluation of negative root by changing polynomial	9
2.	Solution of Algebraic and Transcendental Equations	Locating roots, Bisection method, Regular-Falsi method, Newton Raphson method, Rate of convergence of Newton Raphson method, Secant method, Comparison of Secant method and Newton Raphson method	8
3.	Interpolation	Forward, Backward and central Finite Difference Operators, Fundamental theorem of finite difference, Finite Difference Tables, Factorial function and Reciprocal factorial function, Approximation of function by Taylor's series, Curve fitting, Spline Interpolation, Cubic Spline and Approximation, Errors in cubic spline and its derivates.	8
4.	Numerical Solution of Differential and Integral Equations	Runge-Kutta method to solve ODE, Solution of Laplace Equation, Solution of Fredholm equations, Method of degenerate Kernels, Spline method	8

5.	Application using MATLAB	MATLAB Introduction, Matrix operations, Solution of System of Linear Equations, Polynomial evaluation, Polynomial roots and operations, Polynomial Derivatives, Differentiation of functions, Polynomial Curve fitting, Integration, Standard numerical techniques in MATLAB	9
Total number of Lectures			**42**

Evaluation Criteria

Components	**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. K. Jain, S. R. K. Iyengar and R. K. Jain,** *Numerical Methods for Scientific and Engineering Computations*, New Age International Publishers, 2008.
2.	**Gerald and Wheatley,** *Applied Numerical Analyses*, AW, 1970.
3.	**V. Rajaraman,** *Computer Oriented Numerical Methods*, PHI Learning Pvt. Ltd., 2018
4.	**P. Niyogi,** *Numerical Analysis and Algorithms*, Tata McGraw-Hill Education India, 2003
5.	**B. S. Grewal,** *Numerical methods in Engineering and Science*, Khanna Publishers, Delhi, 2013.
6.	**S. S. Ray,** *Numerical Analysis with Algorithms and Programming*, CRC Press, 2016.

Detailed Syllabus

Lecture-wise Breakup

Course Code	18B12MA311	**Semester** - odd **(specify Odd/Even)**	**Semester** V **Session** 2018 -2019 **Month from** June 2019 to December 2019
Course Name	**Decision making using mathematical and statistical approaches**		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Dr. Pinkey Chauhan	
	Teacher(s) (Alphabetically)	Dr. Pinkey Chauhan	

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Explain the concept of decision making under various environments	Knowledge level C1
CO2	Apply various methods for solving single stage optimal problems in uncertainty and risk environments	Applying Level C3
CO3	Apply decision tree analysis for solving multiple stage optimal problems.	Applying Level C3
CO4	Describe principle of optimality and formulation of dynamic programming problems.	Understanding Level C2
CO5	Identify, formulate and solve problems arising in financial and industrial applications using dynamic programming techniques.	Applying Level C3

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introduction to decision making under different environments	Introduction to decision making process, Components of decision making with examples: Courses of action, States of nature, Pay-off and Pay-off matrix; Definition and examples of decision making under certainty, uncertainty and risk environments.	4
2.	Optimal Decision analysis for Single stage problems	Decision making under uncertainty: Maximin, Maximax, Minimax regret, Laplace Criteria and Hurwitz criterion, Decision making under Risk: Formulation of Payoff Matrix. Expected Monetary Value (EMV); Examples based on EMV, Expected Opportunity Loss (EOL), Expected Value under Perfect Information(EVPI) , Expected Profit under Perfect Information (EPPI), Expected Cost under Perfect Information (ECPI).	12
2.	The Scientific Approach and its applications	Introduction to decision tree analysis for multiple stages, Construction of decision tree diagram, Applications for optimal decision making of multi point decision problems.	6

3.	Introduction to dynamic programming	Introduction to optimization and dynamic programming, Bellmen's principle of optimality: definition with examples, Formulation of dynamic programming problems for continuous and discrete variables.	6
4.	Applications of dynamic programming for optimal decision analysis	Optimal subdivision problems, Shortest route or network problems, Solving linear programming problems using dynamic programming, Applications of Dynamic Programming to cargo loading problems, employment smoothening problems, capital budgeting problems, inventory control problems, product allocation problems.	14
Total number of Lectures			**42**

Evaluation Criteria

Components	**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.	**Bertsekas, D.P.**, Dynamic Programming and Optimal Control, 3rd Ed., Vol 1, Athena Scientific, 2005.
2.	**Anthony, M. and Biggs, N.,** Mathematics for Economics and Finance Methods and Modelling, Cambridge University Press, Cambridge low-priced edition, 2000.
3.	**Sharma, S.D.**, Operation Research, fourteenth edition, Kedarnath & Ramnath Publications, 2003-2004.
4.	**Hiller, F. S. and Leiberman, G. J.**, Introduction to Operations Research, 7th ed., 2001
5	**Taha, H.A.**, Operations Research
6.	**Pearles, B. and Sullivan, C.**, Modern Business Statistics - (Revised}- –Prentice Hall of India.

Detailed Syllabus

Lecture-wise Breakup

Course Code	**16B1NMA531**	**Semester** Odd **(specify Odd/Even)**	**Semester** V **Session** 2018 -2019 **Month from July to December**
Course Name	**DISCRETE MATHEMATICS**		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Dr. Anuj Bhardwaj	
	Teacher(s) (Alphabetically)	Dr. Anuj Bhardwaj	

COURSE OUTCOMES: After the successful completion of this course, the student will be able to		**COGNITIVE LEVELS**
C301-1.1	explain partial order relations, Hasse diagram, lattices and recursive functions.	Understanding Level (C2)
C301-1.2	solve the difference equations using generating function and Z-transform.	Applying Level (C3)
C301-1.3	explain the propositional and predicate calculus to check the validity of arguments.	Understanding Level (C2)
C301-1.4	demonstrate graphs, digraphs, trees and use it to solve the different problems of graph theory.	Applying Level (C3)
C301-1.5	illustrate various algebraic structures and their properties.	Understanding Level (C2)
C301-1.6	explain the theory of formal languages and solve the related problems of automata.	Applying Level (C3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Relations and Lattices	Relations and their composition. Pictorial representation, matrix and graphical representations. Equivalence relations and partitions. Partial ordered relations and Hasse diagram. Lattices.	5
2.	Functions	Functions and Recursively defined functions, generating functions, solution of recurrence relations by generating function. Z transforms, solution of difference equations by Z transform.	8
3.	Propositional Calculus	Propositions- simple and compound. Basic logical operators. Implication. Truth tables. Tautologies and contradictions. Valid arguments and fallacy. Propositional functions and quantifiers.	4
4.	Graphs	Graphs and related definitions, subgraphs, isomorphism, paths and connectivity. Eulerian graph and Konigsberg	7

		problem. Hamiltonian graph. Labelled and weighted graphs. Tree Graphs-Minimum spanning Tree (Prim's algorithm). Graph colorings. Four color problem.	
5.	Directed Graphs	Trees, Digraphs and related definitions. Rooted trees. Algebraic expressions and Polish notation. Sequential representation. Adjacency matrix. Path matrix. Shortest path. Linked representation of directed graphs. Binary trees.	5
6.	Algebraic Structures	Groups- definitions and examples, order of elements, subgroup, condition for subgroups. Quotient groups, Lagrange theorem and applications, Rings, integral domains and Fields- definition and examples.	7
7.	Languages and Grammars	Strings (words) and languages, grammars, types of grammars, Finite state machines, finite state automata, regular languages and regular expressions.	6
Total number of Lectures			**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz, Assignments, Tutorials)
Total	**100**

Recommended Reading material:

1.	Lipschutz, S. and Lipson, M., Discrete Mathematics, 2nd Edition, Tata McGraw-Hill, 1997.
2.	Rosen, K. H., Discrete Mathematics and its Application, 5th Edition, Tata McGraw-Hill, 2003.
3.	Liu, C. L., Elements of Discrete Mathematics, 2nd Edition, Tata McGraw-Hill, 1985.
4.	Kolman, B., Busby, R. C. and Ross, S., Discrete Mathematical Structures, 3rd Edition, Prentice Hall, 1996.
5.	Deo, N., Graph Theory, Prentice Hall, 1980.
6.	Grimaldi, R.P., Discrete and Combinatorial Mathematics, 4th Edition, Pearson Education, 2005.

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NMA532	**Semester** Odd **(specify Odd/Even)**	**Semester** V **Session** 2018 -2019 **Month from** July 2018-Dec 2018
Course Name	Finite Element Methods		
Credits	4	**Contact Hours**	3-1-0

Faculty (Names)	**Coordinator(s)**	Dr. Lokendra Kumar
	Teacher(s) (Alphabetically)	

COURSE OUTCOMES		**COGNITIVE LEVELS**
After pursuing the above mentioned course, the students will be able to:		
C301-2.1	explain different numerical methods for the solution of simultaneous linear equations.	Understanding Level (C2)
C301-2.2	solve ordinary differential equations using 4th order Runge-Kutta and finite difference methods.	Applying Level (C3)
C301-2.3	apply methods of weighted residuals for the solutions of boundary value problems.	Applying Level (C3)
C301-2.4	construct the weak formulation and derivation of shape functions for one and two dimensional problems.	Applying Level (C3)
C301-2.5	organise the elementwise assembly to solve the two point boundary value problems using finite element method.	Applying Level (C3)
C301-2.6	apply finite element method on partial differential equations with given boundary conditions.	Applying Level (C3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Basic Numerical Methods	Gauss-elimination, Gauss Seidel, Thomas algorithm, Gaussian quadrature formula for numerical integration, Runge-Kutta method for IVPs, Finite difference method for BVPs.	10
2.	Finite Element Method	Introduction to finite element method, comparison with finite difference method.	3
3.	Method of Weighted Residuals	Collocation, Subdomain, Method of least squares and Galerkin's method.	8
4.	Variational Formulation	Variational formulation of boundary value problems. Equivalence of Galerkin and Ritz method in some cases. Applications to solve simple problems of ODEs. One dimentional linear, quadratic and higher order elements. Derivation of element equations and their assembly,	12

		imposition of boundary conditions and solution of assembled equations.	
5.	Partial Differential Equations	Two dimensional, triangular, rectangular, quadrilateral, serendipity and isoperimetric elements and their assembly. Discretization with curved boundaries. Solution of two dimensional partial differential equations under different Geometric conditions.	9
Total number of Lectures			**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz, Assignments, Tutorials)
Total	**100**

Recommended Reading material:

1.	**J. N. Reddy**, An Introduction to the Finite Element Method, McGraw-Hill, New York, 1993.
2.	**L. J. Segerlind**, Applied Finite Element Analysis, 2nd Edition, John Wiley and Sons, 1984.
3.	**O. C. Zienkiewicz and R. L. Taylor**, The Finite Element Method, 3rd Edition, McGraw-Hill, 1989.
4.	**D. L. Logan**, A First Course in the Finite Element Method, 2nd Edition, PWS Publishing Company, Boston, 1993.
5.	**R. D. Cook, D. S. Malkus and M. E. Plesha**, Concepts and Applications of Finite Element Analysis, 3rd Edition, John Wiley and Sons, New York, 1989.
6.	**K. J. Bathe**, Finite Element Procedures in Engineering Analysis, Prentice-Hall, Englewood Cliffs, NJ, 1982.
7.	**Gupta, R.S.,** Elements of Numerical Analysis, 1st Ed., Macmillan 2009.

Detailed Syllabus

Lecture-wise Breakup

Course Code	18B12MA312	**Semester** Odd	**Semester** V **Session** 2018 -2019 **Month from** July 2018 to Dec 2018
Course Name	Logical Reasoning and Inequalities		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Dr. Amit Srivastava	
	Teacher(s) (Alphabetically)	Dr. Amit Srivastava	

COURSE OUTCOMES		**COGNITIVE LEVELS**
After pursuing the above mentioned course, the students will be able to:		
C301-9.1	interpret the mathematical foundation of various inequalities.	Understanding level(C2)
C301-9.2	examine inequalities in the field of information theory and cryptography.	Analyzing level(C4)
C301-9.3	apply the concepts of permutation and combination of multi sets in combinatorics.	Applying level(C3)
C301-9.4	apply special numbers in combinatorial and number theoretic problems.	Applying level(C3)
C301-9.5	explain the basic concepts of logical reasoning and solve related problems.	Understanding level(C2)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Inequalities	Basic Inequalities, Inequalities between means with special reference to AGM inequality, Jensen inequality for concave and convex functions, Hermite hadamard inequality, Karamata's inequality, Popoviciu's inequality, Weighted AGM inequality and Young's inequality.	12
2.	Basics of Counting	Pigeon Hole Principle, Binomial Theorem, Properties of binomial coefficients, combinatorial identities, Permutation of Multisets, Multinomial Theorem, Combinations of Multisets, Sterling's Formula, Generalization of Binomial coefficients, Inclusion exclusion principle.	12
3.	Special numbers	Catalan numbers, Partition numbers, difference sequences, Sterling Numbers, Perfect numbers.	10
4.	Logical	Clocks, calendars, binary logic, seating arrangement,	8

	Reasoning	blood relations, logical sequence, assumption, premise, conclusion, linear and matrix arrangement, Syllogism, Binary Logic, Logical sequence & Matching, Mathematical Puzzles with applications.	
Total number of Lectures			**42**

Evaluation Criteria

Components	**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.	**Cerone, P. and Dragomir, S. S.**, Mathematical Inequalities, CRC Press, Boca Raton, FL, 2011
2.	**Praveen, R. V.**, Quantitative Aptitude and Reasoning, Second Edition, Prentice Hall India, 2013.
3.	**Rosen & Kenneth H**, Discrete Mathematics and its Applications, Tata Mc-Graw Hill, New Delhi, 2007.
4.	**Kolman B., Busby R. C. and Ross S.**, Discrete Mathematical Structures, Prentice Hall, 1996.
5.	**Simmons, G. J.,** The Great Book of Puzzles & Teasers, 1999.

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NMA533	**Semester** - Odd **(specify Odd/Even)**	**Semester** V **Session** 2018 -2019 **Month from** July 2018 - Dec 2018
Course Name	Matrix Computations		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Dr. Pato Kumari and Dr. Amita Bhagat	
	Teacher(s) (Alphabetically)	Dr. Amita Bhagat Dr. Pato Kumari	

COURSE OUTCOMES		**COGNITIVE LEVELS**
After pursuing the above mentioned course, the students will be able to:		
C301-3.1	explain the basics of matrix algebra and inverse of a matrix by partitioning.	Understanding level (C2)
C301-3.2	solve the system of linear equations using direct and iterative methods.	Applying Level (C3)
C301-3.3	explain the vector spaces and their dimensions, norm of a vector and matrix.	Understanding level (C2)
C301-3.4	apply the concepts of inner product space to construct Q-R decomposition and orthonormal basis using Gram-Schmidt process.	Applying Level (C3)
C301-3.5	construct Gershgorin's circles and solve eigenvalue problems including power and inverse power methods.	Applying Level (C3)
C301-3.6	analyze systems of differential and difference equations arising in dynamical systems using matrix calculus.	Analyzing Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Matrix Algebra	Basics of matrices, Submatrices, rank of a matrix, Normal Form, Inverse of a matrix by Gauss Jordan Method, Inverse of a matrix by partitioning method and by elementary matrices	6
2.	Linear System of equations	Existence and uniqueness of solution for system of linear equations, Gauss elimination method, Pivoting strategies, Gauss Jacobi and Gauss Siedel method, LU decomposition, Crout's and Doolittle's method	9
3.	Vector and Inner Product Spaces	Vector spaces, Subspaces, Linearly independent and dependent set of vectors, dimension and basis of vector space, Norms of vectors and matrix, Inner product space, orthogonal and orthonormal sets, Projections, Gram-Schmidt process, Q-R decomposition	10
4.	Eigen value Problems	Eigen values and Eigenvectors, Greshgorin's circle, Power and Inverse power methods, Similar, modal and diagonalizable matrices, Quadratic, positive definite and Canonical forms	9

5.	Matrix Calculus	Powers and functions of matrices, Application to solve discrete dynamical systems, solution of initial value problems	8
Total number of Lectures			**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Quiz, Assignments, and 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.	**Bronson, R**., Matrix Methods an Introduction, Academic Press, 1991.
2.	**Golub, G. H**., Matrix Computations, Johns Hopkins University Press, 1996.
3.	**Datta, K. B.**, Matrix and Linear Algebra, Prentice Hall of India, 1990.
4.	**David, W. Lewis**., Matrix Theory, World Scientific, 1991.

Detailed Syllabus

Lecture-wise Breakup

Course Code	17B1NMA533	**Semester** Odd	**Semester** V **Session** 2018 -2019 **Month from** July 2018 to Dec 2018
Course Name	Statistical Information Theory with Applications		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Dr. Priyanka Sangal	
	Teacher(s) (Alphabetically)	Dr. Anuj Dubey and Dr. Priyanka Sangal	

COURSE OUTCOMES		**COGNITIVE LEVELS**
After pursuing the above mentioned course, the student will be able to:		
CO533.1	explain the notions of information, entropy, relative entropy and mutual information.	Understanding Level(C2)
CO533.2	explain fuzzy sets and compare the various measures of discrepancy.	Analyzing Level (C4)
CO533.3	develop and compare Shannon-Fano and Huffman source codes using measures of uncertainty.	Analyzing Level (C4)
CO533.4	analyse the notion of distance measure in pattern recognition generated in Intuitionistic fuzzy environment.	Analyzing Level (C4)
CO533.5	apply information theoretic concepts in encryption and decryption.	Applying Level (C3)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Basics of probability and information theory	Review of Probability theory, Average information, Shannon and Renyi Entropy, Mutual information. Introduction to concepts of directed divergence, inaccuracy and information improvement	10
2.	Information theoretic measures on fuzzy sets	Fuzzy Sets and Intuitionistic fuzzy Sets. Fuzzy Uncertainty and Fuzzy Information Measure, Similarity Measures, Fuzzy Measures of Directed Divergence, Total Ambiguity and Information Improvement, R-Norm Fuzzy Information Measure and its Generalizations.	10
3.	Basics of coding theory with source coding techniques	Data compression, Kraft-Mcmillan Equality and Compact Codes, Encoding of the source output, Shannon-Fano coding, Huffman coding, Lempel-Ziv (LZ) coding, Shannon-Fano-Elias Coding and Introduction to Arithmetic Coding. rate distortion theory, Lossy Source coding.	10

4.	Applications of information theory in Cryptography	Basic concepts of cryptography and secure data, Mathematical Overview and Shannon theory of Cryptography, perfect secrecy and the one time pad, Spurious Keys & Unicity Distance, Classical and Product Cryptosystems. semantic security and Stream ciphers, Characteristics for perfect security, Limitations of perfectly secure encryption, Block and Stream ciphers, Cipher Modes, Substitution Ciphers, Mono-alphabetic Substitution and Poly-alphabetic Substitution, Polygram, Transposition Ciphers, Rail Fence, Scytale, Book cipher, Vernam cipher, Vigenere Tabluae, Playfair, Hill Cipher, Cryptanalysis of Classical Cryptosystems,	12
Total number of Lectures			**42**

Evaluation Criteria

Components	**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.	**Bose, R.**, Information Theory Coding and Cryptography, 3rd Ed, Tata McGraw-Hill, 2016.
2.	**Jain, K. C., and Srivastava, A.,** Information Theory & Coding, 3nd Ed, Genius Publications, 2009
3.	**Stallings, W.,** Cryptography and Network Security Principles and Practices, Prentice Hall, 2003
4.	**Cover, T.M. and Thomas, J. A.,** Elements of Information Theory, 2nd Edition, Wiley, 2006.
5.	**Haykin, S.,** Communication Systems, John Willey & Sons, Inc, Newyork, 4th Ed, 2006
6.	**Behrouz, A. F.,** Introduction to Cryptography and Network Security, McGraw-Hill International Edition, 2008

Detailed Syllabus

Lecture-wise Breakup

Course Code	16B1NMA731	**Semester** Odd **(specify Odd/Even)**	**Semester** V **Session** 2018 -2019 **Month from** July to December
Course Name	Theory of Numbers		
Credits	4	**Contact Hours**	3-1-0
Faculty (Names)	**Coordinator(s)**	Dr. Himanshu Agarwal	
	Teacher(s) (Alphabetically)	Dr. Himanshu Agarwal	

COURSE OUTCOMES		**COGNITIVE LEVELS**
C301-4.1	explain Euclid algorithm, linear Diophantine equations and prime numbers.	Explain Level (C2)
C301-4.2	solve system of linear congruences using properties of congruences.	Solve Level(C3)
C301-4.3	explain numbers of special form and number theoretic functions.	Explain Level (C2)
C301-4.4	apply the concepts of order, primitive roots and indices to solve conguences.	Apply Level (C3)
C301-4.5	apply Legendre symbol and quadratic reciprocity theorem to solve quadratic congruences.	Apply Level (C3)
C301-4.6	apply and analyse the concepts of number theory in hashing, cryptography, calendar and ISBN check digits problems.	Analyse Level (C4)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Divisibility and Primes	Division algorithm, Greatest common divisor, Euclid's algorithm, gcd as a linear combination of coprime integers, Linear Diophantine equations, primes, The fundamental theorem of arithmetic, The Sieve of Eratosthenes, Canonical prime factorization, Least common multiple, Prime number theorem(statement only), Goldbach and twin primes conjectures.	8
2.	Theory of Congruences	Definitions and basic properties, Residue classes, complete residue systems, reduced residue systems, Linear congruences in one variable, Simultaneous linear congruences, Chinese remainder theorem and its applications, Linear congruences in more than one variable, Fermat's theorem, Pseudoprimes and carmichael numbers, Wilson's Theorem	8
3.	Number	Greatest integer function, The number-of-divisors	7

	Theoretic Functions and Numbers of Special Form:	function, The sum-of-divisors function, Multiplicative function, The Mobius function, Mobius inversion formula, The Euler's totient function, Euler's theorem, Perfect numbers, characterization of even perfect numbers, Mersenne primes, Fermat primes	
4.	Primitive Roots and Indices	The order of an integer, Primitive roots, Theory of indicies, Solution of non-linear congruences.	7
5.	Quadratic Residues	Quadratic residues and non-residues, Euler's Criterion, The Legendre symbol, Gauss Lemma, Quadratic reciprocity, Solution of quadratic congruences.	6
6.	Applications	Hashing functions, Cyptosystem, Calendar problem, ISBN check digits	6
Total number of Lectures			**42**

Evaluation Criteria

Components	**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.	**James Strayer**, *Elementary Number Theory*, Waveland Press,,2001
2.	**Kenneth Rosen**, *Elementary Number Theory and its Applications*, 5th Edition, 2005
3.	**I. Niven, H. Zuckerman, H. Montgomery**, *An Introduction to the Theory of Numbers*, 5th Edition, Wiley, 2013.
4.	**David M. Burton**, *Elementary Number Theory*, 7th Edition, McGraw Hill Education (India) Private Limited, 2006

Detailed Syllabus
Lab-wise Breakup

Course Code	15B19EC591	**Semester** Odd **(specify Odd/Even)**	**Semester** 5th **Session** 2018 -2019 **Month from July**
Course Name	Minor Project -1		
Credits	5	**Contact Hours**	…

Faculty (Names)	**Coordinator(s)**	Mr. Raghvenda Kumar Singh
	Teacher(s) (Alphabetically)	Dr. Vimal Kumar Mishra

COURSE OUTCOMES		**COGNITIVE LEVELS**
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)
CO5	Design 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**

Detailed Syllabus
Lab-wise Breakup

Course Code	15B17EC571	**Semester (specify Odd/~~Even~~)**	**Semester V Session** 2018 -2019 **Month from July 2018**
Course Name	Digital Communication Lab		
Credits	1	**Contact Hours**	2

Faculty (Names)	**Coordinator(s)**	Dr. Megha Agarwal, Ms. Bhawana Gupta
	Teacher(s) (Alphabetically)	Abhishek Kashyap, Anand Agrawal, Ashish Goel, Dharmendra Sadhwani, Bhawana Gupta, Megha Agarwal, Reema Budhraja

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Learning about DSO functioning, Function Analyzer, bread board, and circuit connection. Sampling and quantization of an analog signal. Generation & detection of ASK, FSK & PSK using trainer kit.	Understanding (Level II)
CO2	Design circuits for Amplitude Shift Keying, Frequency Shift Keying and Phase Shift Keying using IC LF 398. Understanding of the concept of different line coding schemes and draw corresponding waveforms.	Analyzing (Level IV)
CO3	Understanding the concept of modulation and demodulation.	Understanding (Level II)
CO4	Implement Pulse Code Modulation, Differential Pulse Code Modulation, Delta Modulation, Adaptive Delta Modulation, Quadrature Amplitude Modulation and their demodulation on trainer kit.	Analyzing (Level IV)

Module No.	**Title of the Module**	**List of Experiments**	**CO**
1.	**Experiment 1**	Design a circuit to sample a given signal using IC LF398 and reconstruct the signal from sampled waveform	1
2.	**Experiment 2**	Implement and Test Amplitude Shift Keying Circuit using IC LF 398.	1,2
3.	**Experiment 3**	Implement and Test Frequency Shift Keying Circuit using IC LF 398.	1,2
4.	**Experiment 4**	Implement and Test Phase Shift Keying Circuit using IC LF 398.	1,2
5.	**Experiment 5**	Study of various Line coding Schemes.	2
6.	**Experiment 6**	Study of PCM with Three Modes of Transmission.	3,4
7.	**Experiment 7**	Study of Differential Pulse Code Modulation and Demodulation Technique.	3,4
8.	**Experiment 8**	Study of Delta Modulation Demodulation.	3,4
9.	**Experiment 9**	Study of Adaptive Delta Modulation and Demodulation.	3,4
10.	**Experiment 10**	Study of QAM generation & detection.	3,4
11.	**Experiment 11**	Generation & detection of ASK, FSK & PSK using trainer kit.	1

Evaluation Criteria

Components	**Maximum Marks**
V1	20

V2	20
D2D	60
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.	H. Taub & D. L. Schilling, Principles of Communication Systems, 2nd edition, McGraw-Hill Higher Education
2.	S. Haykin, Digital Communications, John Wiley & Sons, 2001.

Detailed Syllabus
Lecture-wise Breakup

Course Code	15B11EC612	**Semester Odd (specify Odd/Even)**	**Semester** 5th **Session** 2018 -2019 **Month from** …
Course Name	Electromagnetic Engineering		
Credits	4	**Contact Hours**	3-1-0

Faculty (Names)	**Coordinator(s)**	Ashish Gupta (JIIT-128), Dr. Dharmendra Kumar Jhariya (JIIT-62)
	Teacher(s) (Alphabetically)	Mr. Raghvenda Kumar Singh, Dr. Hemant Kumar, Mr. Vishal Saxena, Ms. Monika

COURSE OUTCOMES		**COGNITIVE LEVELS**
CO1	Recall concepts of vector calculus to solve complex problems and relate among different coordinate systems. Explain the basic principles of electrostatics and magnetostatics and relate the electric and magnetic fields using Maxwell's Equations.	Understanding Level (C 2)
CO2	Illustrate the propagation of electromagnetic waves in different medium and their reflection and transmission parameters. Distinguish among different wave polarizations.	Applying Level (C 3)
CO3	Estimate the current, voltage and power for the different types of transmission lines, determine reflection parameters. Demonstrate the Waveguide theory, Wave equations, and evaluate different waveguide parameters.	Evaluating Level (C 5)
CO4	Classify and compare the different parameters associated with the antenna and also interpret the radiation mechanism.	Understanding Level (C 2)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	Introductory material	Review of scalar, vector fields and coordinate systems (cylindrical and spherical coordinate) Electrostatic and Magneto static Fields	6
2.	Maxwell's Equations	Inconsistency of Amperes law, Continuity equation, Displacement current, Maxwell's equations, Boundary conditions	4
3.	Electromagnetic Waves	Wave propagation in free space, Conductors and dielectrics, Polarization, Plane wave propagation in conducting and non conducting media, Phasor notation, Phase velocity, Group velocity; Reflection at the surface of the conductive medium, Surface Impedance, Depth of penetration. Transmission line analogy	11
4.	Poynting Vector and Power	Poynting theorem, Poynting Vectors and power loss in a plane conductor.	4
5.	Transmission Lines	Transmission line equations, characteristic impedance, open and short circuited lines, standing wave and reflection losses. Impedance matching, Smith Chart, Simple and double stub matching	6
6.	Wave guides	Rectangular and circular wave guides- Modes in rectangular and cylindrical coordinates, characteristics, power transmission and losses, excitation of modes. Microwave	8

		coaxial connectors. Rectangular, Circular and semi-circular cavity resonators, Q factor.	
7.	Radiation and Antennas	Scalar and vector potentials. Radiation from a current filament, Antenna characterstics, radiation pattern, radiation intensity, directivity and power gain.	3
		Total number of Lectures	**42**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (12 Marks for assignments + 5 Marks Quiz + 8 Marks for Attendance)
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.	J.D. Kraus and D. Fleisch, *Electromagnetics with Applications*, McGraw-HILL, New York, 5th Edition, 1999
2.	R. Plonsey and R. E. Collin, *Principles and Applications of Electromagnetic Fields*, McGraw Hill, 1982.
3.	D.K. Cheng, *Field and wave Electromagnetics*, Pearson Education, 2nd Edition, 2001.
4.	M.N.O. Sadiku, *Elements o f Electromagnetics*, Oxford University Press, 3rd Edition, 2005.
5	Electromagnetic Engineering by W.H. Hayt and J.A. Buck, (2007) The Tata McGraw Hill Companies

Detailed Syllabus
Lecture-wise Breakup

Course Code	**15B11GE301**	**Semester** Odd **(specify Odd/Even)**	**Semester VSession** 2018 -2019 **Month from:**July to December
Course Name	Environment Sciences		
Credits	3	**Contact Hours**	3

Faculty (Names)	**Coordinator(s)**	Prof. Krishna Sundari S
	Teacher(s) (Alphabetically)	1. Ekta Bhatt 2. Dr. GarimaMathur 3. Prof. Krishna Sundari S 4. Manisha Singh 5. Prof. PammiGauba 6. Dr. Susinjan Bhattacharya

COURSE OUTCOMES		**COGNITIVE LEVELS**
C309.1	Explain different aspects of environment, ecosystem and associated concerns	Understand Level (C2)
C309.2	Identify various practices that can impact the environmental resource management	Apply Level(C3)
C309.3	Apply modern techniques including sustainable solutions and green technologies for a better environment	Apply Level(C3)
C205.4	Survey ground situation on specific environmental aspects, examine risks involved, make a field report and present the findings	Analyze Level(C4)
C205.5	Recall environment related Government regulations, policies, safety norms and Laws.	Remember Level(C1)

Module No.	**Title of the Module**	**Topics in the Module**	**No. of Lectures for the module**
1.	The Multidisciplinary nature of environmental studies & Biodiversity	Definition, scope and importance, Need for public awareness, Types of Ecosystems, World Biomes, Ecosystem functioning, Biogeochemical cycles, Diversity of flora and fauna, species and wild life diversity, Biodiversity hotspots, threats to biodiversity Case studies.	5
2.	Natural resources, Energy consumption & conservation, Global Conventions	Water, Land Energy (Renewable, non-renewable, wind, solar, hydro, Biomass), Mineral, Forest, & Food resources, Role of an individual in conservation of natural resources, Equitable use of resources, Global Conventions on Energy, Kyoto protocol, Case studies .	8
3.	Pollution, hazardous waste management	Air, Water & Land pollution, sources & causes, Space pollution, causes & effects, Electronic waste, Radioactive materials, toxicity limits of pollutants. Critical issues concerning Global environment (Urbanization, population growth, global warming, climate change, acid rain, ozone depletion etc.) and their roots in: cultural, social, political, commercial, industrial, territorial domains, Case studies.	9

4.	Urban planning, Disaster management	Sustainable building, Analyses of seismic data including magnitude and epicenters of earthquakes, Disaster Management and Contingency Planning, Modern safety systems, Case studies.	6
5.	Environmental Impact assessment, Use of Satellite Imaging	Objectives of impact assessment, Study of impact parameters, Methods for impact identification, Economics, Remote sensing imagery from satellite sensors and role in environmental impact studies, Case studies.	5
6.	Sustainability & Planned reversal of human destruction to environment	Redevelopment of brown fields, energy plantations, social forestry, engineering aspects of Re-use & Recycling, biogas for marginal income groups, organic farming, eco-consumerism, dematerialization, green technologies, eco-tourism, Case studies.	5
7.	Environmental Laws & Regulations	Regulation of technology and innovation, Policy and laws, Different Acts such as: Environmental Protection Act, Air and Water Acts, Wildlife and Forest Acts), US-EPA, National Environmental Policy; Function of pollution control boards (SPCB and CPCB), their roles and responsibilities, Eco-mark Scheme, Laws relating to Urban and Rural land use, Ethics, Case studies.	4
8.	Field Work	Explore the surrounding flora & fauna (Study of common plants, insects, birds document environmental assets), documentation of industries in local region and their possible effects, measure of water, air and land quality, Visit to a local polluted site-Urban/Rural /Industrial / Agricultural, Study of simple ecosystems-pond, river, hill slopes etc	5
Total number of Lectures			**47**

Evaluation Criteria

Components	**Maximum Marks**
T1	20
T2	20
End Semester Examination	35
TA	25 (Assignments, Attendance)
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.	Chiras D D.(Ed.). 2001. Environmental Science – Creating a sustainable future. 6th ed. Jones &Barlett Publishers.
2.	**Joseph, B., 2005, Environmental Studies, Tata McGraw Hill, India**
3.	**Textbook of Environmental Studies for UG Courses - ErachBharucha, University Press**
4.	Jogdanand S N 2004. Environmental Biotechnology: Industrial Pollution Management. Himalaya Pub. House, Delhi 284p
5.	David P Lawrence. 2003. Environment Impact assessment, Wiley publications
6.	Issues of the Journal: Down to Earth, published by Centre for Science and Environment