B.E. Semester –VII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							**B.E.SEM :VII**		
Course Name :Enterprise Network Design							**Course Code :ITC701**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**--**	**TW**	
4	-	2	6	5	20	80	--	25	**125**
IA: In- Semester Exam- Paper Duration –1 Hours **ESE : End Semester Exam- Paper Duration - 3 Hours** **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).									
Prerequisite: Computer networks, Wireless Network									

Course Objective: The course intends to deliver the fundamentals of network design for an enterprise network, network hierarchy and its modular approach with campus and data center design. Also to analyze Enterprise Edge WAN Technologies, create an IP addressing plan for enterprise network application.

Course Outcomes: Upon completion of the course Students will be able to:

S.No.	Course Outcomes	Cognitive levels of attainment as per bloom's Taxonomy
1	Understand the customer requirements and Apply a Methodology to Network Design	L1,L2
2	Structure and Modularize the Network	L1,L2
3	Design Basic Campus and Data Center Network.	L1,L2,L3
4	Design Remote Connectivity	L1,L2,L3
5	Design IP Addressing and Select suitable Routing Protocols for the Network	L1,L2,L3,L4
6	Compare Openflow controllers and switches with other enterprise networks.	L1,L2,L3,L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per bloom's Taxonomy
	Prerequisite 1.OSI Reference Model and TCP/IP Protocol Suite 2.Routing IP Addresses 3.Internetworking Devices	02	-
1	**Applying a Methodology to Network Design** The Cisco Service Oriented Network Architecture, Network Design Methodology, Identifying Customer Requirements, Characterizing the Existing network and Sites, Using the Top-Down Approach to Network Design, The Design Implementation Process.	06	L1,L2,L3,L4
2	**Structuring and Modularizing the Network:** Network Hierarchy, Using a Modular Approach to Network Design, Services Within Modular Networks, Network Management Protocols and Features	09	L1,L2,L3
3	**Designing Basic Campus and Data Centre Networks** Campus Design Considerations, Enterprise Campus Design, Enterprise Data Center Design Considerations	09	L1,L2,L3,L4,L5,L6
4	**Designing Remote Connectivity** Enterprise Edge WAN Technologies, WAN Design, Using WAN Technologies, Enterprise Edge WAN and MAN Architecture, Selecting Enterprise Edge Components, Enterprise Branch and Teleworker Design.	10	L1,L2,L3,L4,L5,L6

5	**Designing IP Addressinginthe Network &Selecting Routing Protocols** Designing an IP Addressing Plan, Introduction to IPv6, Routing Protocol Features, Routing Protocols for the Enterprise, Routing Protocol Deployment, Route Redistribution, Route Filtering, Redistributing and Filtering with BGP, Route Summarization	11	L1,L2,L3,L4,L5,L6
6	**Software Defined Network** Understanding SDN and Open Flow : SDN – SDN Building Blocks, OpenFlow messages – Controller to Switch, Symmetric and Asynchronous messages, Implementing OpenFlow Switch, OpenFlow controllers , POX and NOX, Open Flow in Cloud Computing, Case study: how SDN changed Traditional Enterprise network Design	7	L1,L2,L3,L4
Total Hrs.		**54**	

Guidelines for Network Design laboratory:

1. The case study of College Campus Network must be designed as a mini project work which is to be conducted by a group of three students
2. Each group will be associated with a subject Incharge/ mini project mentor. The group should meet with the concerned faculty during Laboratory hours and the progress of work discussed must be documented.
3. The students must understand the requirements of a College campus enterprise network.
4. The students must outline the major design areas of a College campus enterprise network.
5. The students must identify the functional areas and construct high level modules for the College campus enterprise architecture.
6. The students must analyze the existing College campus enterprise network and propose up gradations to existing infrastructure.
7. The students must identify the network devices required and their locations to design a College campus enterprise network.
8. The students must configure the network devices required as per the Core Layer, Access Layer and Distribution Layer.
9. The students must Design the Server Farm for enterprise network using a configuration tool and also discuss if any other improvement is required.
10. The students must Prepare a bill of materials of all the networking devices. Develop a Request for Proposal-RFP for the enterprise network
11. The students must identify the technology for Remote Site connectivity and evaluate it as per the application requirements of the college campus enterprise network.
12. Propose a suitable IP addressing plan for the enterprise network.
13. Determine a suitable routing protocol for the enterprise network.
14. Create and Test the designed college campus enterprise network using a tool.
15. Use Nagios tool for enterprise infrastructure monitoring tool
16. Each group may present their work in various project competitions and paper presentations.
17. A detailed report is to be prepared as per guidelines given by the concerned faculty.

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1.	Authorized Self-Study Guide, Designing for Cisco Internetwork Solutions (DESGN),	Diane Teare.	Cisco Press	2nd	2003
2.	Network Analysis, Architecture, and Design	Morgan Kaufman, James D.	Elsevier	3rd	2007
3.	Software Defined Networking with Open Flow	SiamakAzodolmolky	Packt	2nd	2017
4.	Top-Down Network Design (Networking Technology)	Priscilla Oppenheimer	Cisco Press Book	3rd	2004
5.	CCDA Cisco official Guide	http://www.ciscopress.com/store/ccda-200-310-official-cert-guide-9781587144547			

Online References:

Sr. No.	Website Name	URL	Modules covered
1.	http://ciscodocuments.blogspot.com	http://ciscodocuments.blogspot.com/2011/06/chapter-2-applying-methodology-to.html	M1
2.	http://www.ciscopress.com	http://www.ciscopress.com/articles/article.asp?p=1073230	M2
3.	https://www.oreilly.com https://www.cisco.com	https://www.oreilly.com/library/view/authorized-self-study-guide/9781587052729/ch04.html#ch04lev1sec1 https://www.cisco.com/c/dam/global/ro_ro/assets/ciscoexpo/2010/src/docs/presentations/12.pdf	M3
4.	http://www.ciscopress.com	http://www.ciscopress.com/articles/article.asp?p=1743279	M4
5.	http://www.ciscopress.com	http://www.ciscopress.com/articles/article.asp?p=174107	M5
6.	https://www.cisco.com	https://www.cisco.com/c/en/us/td/docs/solutions/Enterprise/Data_Center/VMDC/SDN/SDN.html	M6

B.E. Semester –VII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							**B.E.(SEM :** VII)		
Course Name: Infrastructure Security							**Course Code : ITC702**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**OR**	**TW**	
4	--	2	6	5	20	80	25	25	**150**
IA:In-Semester Exam- Paper Duration –1 Hours **ESE : End Semester Exam- Paper Duration - 3 Hours** **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).									
Prerequisite: Computer Networks, Cryptography and Network Security									

Course Objective: The course intends to deliver the fundamentals of infrastructure security, software vulnerabilities with its countermeasures, aspects of wireless network infrastructure and protocols. Also to analyze Open Web Applications, Web services with security policies for security management.

Course Outcomes: Upon completion of the course students will be able to:

S.No.	Course Outcome	Cognitive levels of attainment as per bloom's Taxonomy
1	Understand the concept of vulnerabilities, attacks and protection mechanisms	L1,L2
2	Analyze and evaluate software vulnerabilities and attacks on databases and operating systems	L1,L2,L3,L4
3	Explain the need for security protocols in the context of wireless communication	L1,L2,L3,L4
4	Understand and explain various security solutions for Web and Cloud infrastructure	L1,L2
5	Understand, and evaluate different attacks on Open Web Applications and Web services	L1,L2
6	Design appropriate security policies to protect infrastructure components	L1,L2,L3,L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per bloom's Taxonomy
1	**Introduction** Cyber-attacks, Vulnerabilities, Defense Strategies and Techniques, Authentication Methods- Password, Token and Biometric, Access Control Policies and (DAC,MAC, BAC, ABAC, BIBA, Bell LaPadula),Authentication and Access Control Services- RADIUS, TACACS, and TACACS+	06	L1,L2
2	**Software Security** Software Vulnerabilities: Buffer overflow, Format String, Cross-Site Scripting, SQL Injection, Malware: Viruses, Worms,Trojans,LogicBomb, Bots,Rootkits **Operating System Security**: Software Memory and Address Protection, File Security Protection Mechanism, User Authentication. Linux and Windows: Vulnerabilities, File System Security **Database Security**: Database Security Requirements, Reliability and Integrity, Sensitive Data, Inference Attacks, Multilevel Database Security	10	L1,L2,L3,L4

3	**Wireless Security** Mobile Device Security- Security Threats, Device Security, GSM, Security, IEEE 802.11xWireless Security, VPN Security, Wireless Intrusion Detection System (WIDS)	08	L1,L2,L3,L4
4	**Cloud Security** Cloud Security Risks and Counter measures, Data Protection in Cloud, Cloud Application Security, Cloud Management, Cloud Security as a Service, SAML, OAuth	09	L1,L2,L3,L4
5	**Web Security** Web Security Considerations, User Authentication and Session Management, Cookies, SSL, HTTPS, SSH, Privacy on Web, Web Browser Attacks, Account Harvesting, Web Bugs, Clickjacking ,Cross-Site Request Forgery, Session Hijacking and Management, Phishing and Pharming Techniques, DNS Attacks, Web Service Security, Secure Electronic Transaction, Email Attacks, Web Server Security as per OWASP, Firewalls, Penetration Testing–	12	L1,L2,L3
6	**Information Security and Risk Management** Security Policies, Business Continuity Plan, Risk Analysis, Incident Management, Legal System and Cybercrime, Ethical Issues in Security Management.	07	L1,L2,L3,L4
Total Hrs.		**52**	

List of Practicals/Experiments:

S.No.	Type of Experiment	Practical/Experiment topic	Hrs.	Cognitive levels of attainment as per bloom's Taxonomy
1	**Basic experiment**	Exploring Kali Linux and the inbuilt tools for reconnaissance and ethical hacking.	2	L1,L2,L3,L4
3	**Design Experiment**	Implementation and analysis of SQL injection Attack	2	L1,L2,L3,L4
4		Performing a penetration testing using Metasploit	2	L1,L2
5		Exploring Router security, access listsusing packet tracer	2	L1,L2
6		Exploring VPN security using Packet tracer	2	L1,L2
7		Implementation of Buffer overflow attack and its analysis using Splint, Cppcheck etc.	2	L1,L2,L3,L4
8		Setting up personal Firewall using Iptables	2	L1,L2,L3,L4
9		Exploring wireless security tools like Kismet, NetStumbler etc.	2	L1,L2,L3
10		Configuration of mod Security, core rule set on apache server.	2	L1,L2,L3
11		Install and use a security app on an Android mobile (e.g. Droidcrypt)	2	L1,L2,L3,L4,L5,L6
12	**Advanced experiment**	Explore forensics tools in Kali Linux for acquiring, analyzing and duplicating data	2	L1,L2,L3
13		Exploring Authentication and access control using RADIUS, TACACS and TACACS+	2	L1,L2,L3
14	**Mini project / Case study**	Case study based on different tools	6	L1,L2,L3,L4,L5,L6
Total Hrs.			**30**	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Computer Security Principles and Practice	William Stallings	Pearson Education	6th	2014
2	Security in Computing	Charles P. Pfleeger	Pearson Education	5th	2016
3	Network Security and Cryptography	Bernard Menezes	Cengage Learning	1st	2010
4	Network Security Bible	Eric Cole	Wiley	2nd	2009
5	Computer Security	Dieter Gollman	Wiley	3rd	2011

Online References:

S. No.	Website Name	URL	Modules Covered
1.	https://www.myvuniversity.com/p/infrastructure-security-itc702	https://www.myvuniversity.com/courses/infrastructure-security-itc702/lectures/8475567	M1
2.	https://www.myvuniversity.com/p/infrastructure-security-itc702	https://www.myvuniversity.com/courses/infrastructure-security-itc702/lectures/8475520	M2
3.	https://www.myvuniversity.com/p/infrastructure-security-itc702	https://www.myvuniversity.com/courses/infrastructure-security-itc702/lectures/8475558	M3
4.	https://www.myvuniversity.com/p/infrastructure-security-itc702	https://www.myvuniversity.com/courses/infrastructure-security-itc702/lectures/8475775	M4
5.	https://www.w3schools.in/cyber-security	https://www.w3schools.in/cyber-security/network-protocols-and-its-security/	M5
6.	https://www.w3schools.in/cyber-security	https://www.w3schools.in/cyber-security/network-protocols-and-its-security/	M6

B.E. Semester –VII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							**B.E.SEM :VII**		
Course Name : Artificial Intelligence							**Course Code : ITC703**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**OR**	**TW**	**150**
04	-	02	06	05	20	80	25	25	

IA:In-Semester Exam- Paper Duration –1 Hours

ESE : End Semester Exam- Paper Duration - 3 Hours

Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).

Prerequisite: Knowledge of any programming language, Data structures.

Course Objective: The course intends to deliver the fundamentals of Artificial Intelligence, concepts of a Rational Intelligent Agent, analyze and evaluate AI concepts to real life problems using heuristic search, Bayes networks, natural language processing and Cognitive Computing.

Course Outcomes: Upon completion of the students will be able to:

S.No.	Course Outcomes	Cognitive levels of attainment as per bloom's Taxonomy
1	Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents.	L1,L2
2	Analyze and formalize the problem as a state space, graph, design heuristics and select amongst different search or game based techniques to solve them.	L1,L2,L3,L4
3	Develop intelligent algorithms for constraint satisfaction problems and also design intelligent systems for Game Playing	L1,L2,L3
4	Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.	L1,L2,L3
5	Formulate and solve problems with uncertain information using Bayesian approaches.	L1,L2,L3,L4
6	Apply concept Natural Language processing to problems leading to understanding of cognitive computing.	L1,L2,L3,L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per bloom's Taxonomy
1	**Introduction to Intelligent Systems and Intelligent Agents** Introduction to AI, AI Problems and AI techniques, Solving problems by searching, Problem Formulation. State Space representation Structure of Intelligent agents, Types of Agents, Agent Environments PEAS representation for an Agent.	**04**	L1,L2
2	**Search Techniques** Uninformed Search: DFS, BFS, Uniform cost search, Depth Limited Search, Iterative Deepening. Informed Search: Heuristic functions, Hill Climbing, Simulated Annealing, Best First Search, A*, Constraint Satisfaction Programming: Crypto Arithmetic, Map Coloring, N-Queens. Adversarial Search: Game Playing, Min-Max Search, Alpha Beta Pruning.	**10**	L1,L2,L3
3	**Knowledge and Reasoning** A Knowledge Based Agent, Overview of Propositional logic, First Order Predicate Logic, Inference in First Order Predicate Logic: Forward and Back ward Chaining, Resolution.	**10**	L1,L2,L3,L4

4	**Planning** Introduction to Planning, Planning with State Space Search, Partial Ordered planning, Hierarchical Planning, Conditional Planning	**7**	L1,L2
5	**Uncertain Knowledge and Reasoning** Uncertainly, Representing Knowledge in an Uncertain Domain, Conditional Probability, Joint Probability, Bayes' theorem, Belief Networks, Simple Inference in Belief Networks.	**7**	L1,L2,L3
6	**Natural Language** Language Models, Natural Language for Communication Syntacti Analysis, Augmented Grammars and Semantic Interpretation, Machine Translation. Overview of Cognitive Computing: Foundation of Cognitive Computing, List of Design Principles for Cognitive Systems, Natural Language Processing in Support of a Cognitive System.	**11**	L1,L2
Total Hrs.		**49**	

Books and References:

S. No	Title	Authors	Publisher	Edition	Year
1	Artificial Intelligence: A Modern Approach	Stuart Russell and Peter Norvig	Pearson Education	2nd	2005
2	Artificial Intelligence	Elaine Rich, Kevin Knight, Shivshankar B Nair	McGraw Hill	3rd	2017
3	Cognitive Computing and Big Data Analytics	Judith S. Hurwitz, Marcia Kaufman, Adrian Bowles	Wiley India	1st	2015
4	AI-Structures and Strategies for Complex Problem Solving	George Lugar	Pearson Education	4th	2008
5	Principles of Artificial Intelligence	Nils J. Nilsson	Narosa Publication	1st	1982
6	Artificial Intelligence	Patrick H. Winston	Pearson Education.	3rd	-
7	A First Course in Artificial Intelligence	Deepak Khemani	McGraw Hill Publication	1st	2017
8	Smart Machines - IBM′s Watson and the Era of Cognitive Computing	John Kelly , Steve Hamm	Columbia Business School Publishing	-	2013

Online References:

S. No.	Website Name	URL	Modules covered
7.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_agents_and_environments	M1
8.	https://data-flair.training	https://data-flair.training/blogs/popular-search-algorithms/	M2
9.	https://www.javatpoint.com	https://www.javatpoint.com/knowledge-representation-in-ai	M3
10.	https://www.tutorialspoint.com	1. https://www.tutorialride.com/artificial-intelligence/planning-in-ai.htm 2. http://aima.cs.berkeley.edu/newchap11.pdf	M4
11.	https://www.javatpoint.com	https://www.javatpoint.com/bayesian-belief-network-in-artificial-intelligence	M5
12.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/artificial_intelligence/artificial_intelligence_natural_language_processing.htm	M6

List of Practical's / Experiments:

S.No.	Type of Experiment	Practical/Experiment topic	Hrs.	Cognitive levels attainment as per bloom's Taxonomy
1	**Basic experiment**	To Study: a) Design of Intelligent System using PEAS. b) Problem Definition with State Space Representation	4	L1,L2,L3,L4
2		Implementing Water jug problem using 1. BFS. 2. DFS (Un-Informed Search) Note: Any One Technique	2	L1,L2,L3,L4

3		Implementing Tic-Tac-Toe problem to demonstrate Min – Max and Alpha Beta.	2	L1,L2,L3,L4
4	**Design Experiment**	Implementing 8 puzzle problem using A*	2	L1
5		Implementation of Block Word Problem Using Hill Climbing.	2	L1,L2,L3
6		Implementation of CSP and Game playing algorithms.	4	L1,L2,L3
7		Assignment on Predicate Logic, forward and backward reasoning and resolution.	2	L1,L2,L3
8		Design of a Planning system using STRIPS.	2	L1,L2,L3
9		Implementation of Bayes' Belief Network.	2	L1,L2,L3
10		Mini project: Construction of a domain specific ChatBot using Natural Language Processing techniques. (Applications can include: Medical Diagnosis, Personal Shopping Assistant, Travel Agent, Troubleshooting etc.)	8	L1,L2,L3,L4,L5, L6
		Total Hrs.	**30**	

B.E. Semester –VII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							**B.E.SEM :**VII		
Course Name :Storage Area Network							**Course Code :ITDLO7031**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	
4	-	-	4	4	20	80	--	--	**100**
IA: In-Semester Assessment - Paper Duration – 1 Hours **ESE: End Semester Examination - Paper Duration - 3 Hours** **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).									
Prerequisite: Computer Network, Operating system									

Course Objective: The course intends to deliver the fundamental of Storage Area Network, Data protection, storage technologies, architecture, protocols, and infrastructure. Also to know applications of SAN, SAN management and analyze SAN Technology.

Course Outcomes: Upon completion of the course students will be able to:

S.No.	**Course Outcomes**	**Cognitive levels of attainment as per Bloom's Taxonomy**
1	Analyse the limitation soft the client-server architecture and evaluatetheneedfordataprotectionandstoragecentricarchitecturessuchasIntelligentstoragesystem.	L1,L2,L3,L4
2	Understand, interpret and examine various SAN technologies.	L1,L2
3	Describe and sketch the SAN architecture and its uses.	L1,L2
4	Classifytheapplicationsaspertheirrequirementsandselectrelevant SANsolutions.	L1,L2,L3,L4
5	UnderstandandevaluatedifferentSANmanagementstrategiestofulfillbusinesscontinuityrequirements.	L1,L2
6	Design case studies on NAS, SAN and SAN/NAS	L1,L2,L3,L4,L5,L6

Detailed Syllabus:

Module No.	**Topics**	**Hrs.**	**Cognitive levels of attainment as per Bloom's Taxonomy**
	Prerequisite Networking Protocols, Filesystem and Memory management	02	L1,L2
1	**Introduction to Storage System** Introduction: Storage oriented architecture, Storage Systems, Data center Infrastructure, Challenges in managing information, Information life cycle; Basics of Storage System: Components of Storage System, Disk Drive components and Performance, Components of Host; Data Protection:RaidComponentsandtypes,RAIDtechnologiesandRAIDlevels, RAID impact on disk performance; Intelligent Storage System" Components of ISS, Storage Provisioning and types of ISS	09	L1,L2

2	**Network Attached Storage** Network Hierarchy, Using a Modular Approach to Network Design, Storage on Network: NAS hardware and software architecture, NAS connectivity, NAS as a Storage System; NAS Hardware devices; NAS software components; NAS connectivity options: NAS connectivity hardware and Software Architecture.	**06**	L1,L2,L3,L4
3	**Storage Area Networks** Architecture Overview: Creating Network for storage; Hardware devices: Fibre Channel Switch, Host Bus Adaptors, Putting the Storage in SANs, Fabric Operation from a hardware perspective, SAN hardware considerations; Software Components: The switch's operating system, device drivers, the supporting components, considerations for SAN software; Configuration options for SANs: Connecting in to the data center, the evolving network and device connections, SAN configuration guidelines	9	L1,L2,L3,L4
4	**Applications-Putting it together** Defining the I/O workload: Storage Planning and capacity planning, the Definition and characterization of workloads, the business application, I/O content and workloads, Considerations for I/O workloads in storage networking; Applying SAN solution: SAN work load characterization, applying SAN to OLTP workloads, transactional workloads; Applying NAS solution: NAS work load characterization, applying NAS to departmental workloads, enterprise web workloads and specialized workloads; Considerations when integrating SN and NAS: Differences and similarities, the need to integrate, future storage connectivity and integration.	10	L1,L2,L3,L4
5	**Management** Planning business continuity: Defining the environment, the role of storage networking in business continuity, storage design and implementation of the business continuity planning; Managing availability: Availability Metrics, Implementing the plan; Maintaining Serviceability: Tracking the configurations, Investigating the changes and closing the loop on serviceability; Capacity Planning: Storage Analysis, developing and implementing plan for storage, Modelling performance and capacity requirements; Security considerations: Overview of Information security, Security methods, Storage Security challenges, FCAN security, NAS security	**10**	L1,L2,L3,L4
6	**Case studies** Case studies on NAS, SAN,SAN/NAS	**06**	L1,L2,L3,L4
	Total Hrs.	**52**	

Books and References

S. No	Title	Authors	Publisher	Edition	Year
1	Storage Networks: The Complete Reference	Spalding, Robert	Tata McGraw-Hill Education,	2nd	2003
2	"Storage Network Management and Retrieval"	Vaishali Khairnar, Nilima Dongre	Wiley	1st	2012
3	"Storage Area Network Essentials: A Complete Guide to Understanding and Implementing SANs"	Richard Barker,PaulMassiglia	WileyIndia	2nd	2005
4	"Storage Networks Explained"	U lf Troppens, Wolfgang Muller-Friedt,RainerWolafka	Wiley Publication	2nd	2006
5	"InformationStorageandManagement"	G.Somasundaram,AlokShrivastava	Wiley	2nd	2008

Online References:

S. No.	Website Name	URL	Modules Covered
1.	NPTEL	https://nptel.ac.in/courses/106108058/	M1
2.	Hpe.com	https://www.hpe.com/us/en/storage.html	M2
3.	kwtrain.com	https://www.kwtrain.com/blog/introduction-to-storage-area-network-san-technologies	M3
4.	Flackbox.com	https://www.flackbox.com/nas-network-attached-storage-overview	M4
5.	NPTEL	https://nptel.ac.in/courses/117101053/15	M5
6.	NPTEL	https://nptel.ac.in/courses/106106127/59	M6

B.E. Semester –VII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							**B.E.SEM :VII**		
Course Name :Mobile Application Development							**Course Code : ITDLO7032**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	
4	-	-	4	4	20	80	--	--	**100**
IA:In-Semester Exam- Paper Duration –1 Hours **ESE : End Semester Exam- Paper Duration - 3 Hours** **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Completion of Practical (40%) and Attendance/Learning Attitude (20%).								Timely	
Prerequisite: Internet Programming, Database Management System									

Course Objective: The course intends to deliver the fundamental knowledge of Android platform and its architecture, apply and create Android UI designing, broadcast receivers, Internet services, SQLite Database, integrate multimedia, camera, Location based services and know about Mobile security issues.

Course Outcomes:Upon completion of the course students will be able to:

S. No	Course Outcomes	Cognitive levels of attainment as per bloom's Taxonomy
1	Describe Android platform, Architecture and features.	L1,L2
2	Design User Interface and develop activity for Android App.	L1,L2,L3,L4,L5,L6
3	Use Intent , Broadcast receivers and Internet services in Android App.	L1,L2,L3,L4,L5,L6
4	Design and implement Database Application and Content providers.	L1,L2,L3,L4,L5,L6
5	Use multimedia, camera and Location based services in Android App.	L1,L2,L3,L4,L5,L6
6	Discuss various security issues in Android platform	L1,L2

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per bloom's Taxonomy
1	**Introduction to Android and Architecture of Android** **Prerequisite:** Basics of HTML5, CSS3 & XML, Introduction of Android platform, Android features, Android Marketplace, Evolution of Android OS, Android Application Architecture, Developing for Android, Developing for Mobile and Embedded Devices, Android Development Tools.	**09**	L1,L2
2	**Applications, Activities and Building User Interface** Application: Application Manifest File, Externalizing Resources, Android Application Lifecycle and Android Application Class. Android Activity: Creating activities, Activity lifecycle and Android Activity classes. User Interface: Fundamental Android UI Design, Layouts, Fragments, Designing UI with views, Creating new views, widget toolbox, Adapters.	**08**	L1,L2,L3,L4,L5,L6

3	**Intents, Broad Cast receiver and Internet Resources** Introducing Intents, Linking Activities Using intents, Calling Built-in Applications Using intents, Displaying notifications, Creating Intent Filters and Broadcast Receivers, Downloading and Parsing Internet Resources, Using the Download Manager, Internet Services, Connecting to Google App Engine, Downloading Data Without Draining the Battery.	**08**	L1,L2,L3,L4,L5,L6
4	**Data Persistence and Content Providers** Introducing Android Databases, Introducing SQLite, Content Values and Cursors, Working with SQLite Databases, Parsing an XMLdocument, Parsing JSON data. Creating Content Providers, Using Content Providers, Adding Search to Your Application, Native Android Content Providers	**09**	L1,L2,L3,L4,L5,L6
5	**Audio, Video, Camera, Maps, Geocoding and Location Based Services** Playing Audio and Video, Manipulating Raw Audio, Using Audio , Using the Camera for Taking Pictures, Recording Video, Using Media Effects, Adding Media to the Media Store. Using Location-Based Services, Using the Emulator with Location-Based Services, Selecting a Location Provider, Finding Your Current Location, Location Updates, Proximity Alerts, Geocoder, Map-Based Activities, Displaying Maps	**08**	L1,L2,L3,L4,L5,L6
6	**Securing and Publishing Android Application** Android Security Model, Android's Manifest Permissions, Mobile Security Issues, Recent Android Attacks, Pen Testing Android. Preparing for Publishing, Deploying APK Files	**08**	L1,L2
Total Hrs.		**50**	

Books and References:

S. No	Title	Authors	Publisher	Edition	Year
1	Professional Android 4 Application Development	RETO MEIER	Wrox publication	3rd	2012
2	Android Security attack and defenses, by CRC Press	Abhishek Dubey, Anmol Misra	CRC Press	1st	2013
3	Beginning Android Application Development	Wei-meng Lee	Wrox publication	1st	2011
4	Android Application Development For Dummies	Michael Burton, DonnFelker	John Wiley & Sons	2nd	2012
5	Android Cookbook	Ian F. Darwin	O'Reilly Media	1st	2011

Online References:

S. No.	Website Name	URL	Modules Covered
1.	https://developer.android.com https://www.tutorialspoint.com/	https://developer.android.com/training/basics/firstapp https://www.tutorialspoint.com/android/android_application_components	M1
2.	https://developer.android.com https://www.tutorialspoint.com/	https://developer.android.com/training/basics/firstapp https://www.tutorialspoint.com/android/android_application_components	M2
3.	https://www.udemy.com/ https://www.coursera.org/ https://www.tutorialspoint.com/	https://www.udemy.com/learn-android-application-development-y/ https://www.coursera.org/specializations/android-app-development https://www.tutorialspoint.com/android/android_intents_filters.htm	M3
4.	https://www.udemy.com/ https://www.coursera.org/ https://www.tutorialspoint.com/	https://www.udemy.com/learn-android-application-development-y/ https://www.coursera.org/specializations/android-app-development https://www.tutorialspoint.com/android/android_intents_filters.htm	M4
5.	https://www.udemy.com/ https://www.coursera.org/ https://www.tutorialspoint.com/	https://www.udemy.com/learn-android-application-development-y/ https://www.coursera.org/specializations/android-app-development https://www.tutorialspoint.com/android/android_intents_filters.htm	M5
6.	https://www.udemy.com/ https://www.coursera.org/ https://www.tutorialspoint.com/	https://www.udemy.com/learn-android-application-development-y/ https://www.coursera.org/specializations/android-app-development https://www.tutorialspoint.com/android/android_intents_filters.htm	M6

B.E. Semester –VII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							**B.E.SEM :VII**		
Course Name :High Performance Computing							**Course Code :ITDLO7033**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	**100**
4	-		4	4	20	80	--	--	

- **IA: In-Semester Assessment - Paper Duration – 1 Hours**
- **ESE: End Semester Examination - Paper Duration - 3 Hours**

Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).

Prerequisite: Computer Organization

CourseObjective: The course in tends to deliver the fundamentalsofparallelprocessing,parallelprogrammingonhighperformance computing. Also to analyze issues of parallel programming, concepts of message passing paradigm,opensourcetools,andMulti-coreprocessor.

Course Outcomes:Upon completion of the course students will be able to:

S.No.	**Course Outcomes**	**Cognitive levels of attainment as per bloom's Taxonomy**
1	Memorize parallel processing approaches	L1,L2
2	Describe different parallel processing platforms involved in achieving High Performance Computing.	L1,L2
3	Discuss different design issues in parallel programming	L1,L2,L3,L4
4	Develop efficient and high performance parallel programming	L1,L2,L3
5	Learn parallel programming using message passing paradigm using open source APIs.	L1,L2
6	Design algorithms suited for Multicore processor and GPU systems using OpenMP and CUDA	L1,L2,L3,L4

Detailed Syllabus:

Module No.	**Topics**	**Hrs.**	**Cognitive levels of attainment as per bloom's Taxonomy**
1	**Introduction** Introduction toParallelComputing: Motivating Parallelism, ScopeofParallelComputing,Levelsof parallelism (instruction, transaction, task, thread, memory, function), Models (SIMD, MIMD, SIMT, SPMD, Dataflow Models, Demand-driven Computation),Parallel Architectures:Interconnectionnetwork,ProcessorArray, Multiprocessor.	07	L1,L2
2	**Parallel Programming Platforms** Parallel Programming Platforms:Implicit Parallelism: Trends in Microprocessor & Architectures, Limitations of Memory System Performance, Dichotomy of Parallel Computing Platforms, Physical Organization of Parallel Platforms, Communication Costs in Parallel Machines	07	L1,L2
3	**Parallel Algorithm Design** Principles of Parallel Algorithm Design: Preliminaries, Decomposition Techniques, Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing, Methods for Containing Interaction Overheads, Parallel Algorithm Models, Basic Communication operations: Broadcast and Reduction Communication types	10	L1,L2,L3,L4

4	**Performance Measures** Performance Measures : Speedup, execution time, efficiency, cost, scalability, Effect of granularity on performance, Scalability of Parallel Systems, Amdahl's Law, Gustavson's Law, Performance Bottlenecks	06	L1,L2,L3,L4
5	**Fundamental Design Issues in HPC** Programming Using the Message-Passing Paradigm: Principles of Message Passing Programming, The Building Blocks: Send and Receive Operations, MPI: the Message Passing Interface, Topology and Embedding, Overlapping Communication with Computation, Collective Communication and Computation Operations, One-Dimensional Matrix-Vector Multiplication, Single-Source Shortest-Path, Sample Sort, Groups and Communicators, Two-Dimensional Matrix- Vector Multiplication, Introduction to OpenMP.	12	L1,L2
6	**General Purpose Graphics Processing Unit (GPGPU)** CUDA enabled GPGPU, GPGPU architecture, GPGPU programming using CUDA, Introduction to CUDA Programming	10	L1,L2
Total Hrs.		**52**	

Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1	"Introduction to Parallel Computing",	AnanthGrama, Anshul Gupta, George Karypis, Vipin Kumar	Pearson Education	2nd	2007
2	"Advanced Computer Architecture: Parallelism, Scalability, Programmability"	Kai Hwang, Naresh Jotwani	McGraw Hill,	2nd	2010
3	"CUDA by Example – An Introduction to General Purpose GPU Programming"	Edward Kandrot and Jason Sanders	Addison-Wesley Professional	1st	2010
4	"Introduction to High Performance Computing for Scientists and Engineers"	Georg Hager, Gerhard Wellein	Chapman & Hall / CRC Computational Science series	3rd	2011
5	"Parallel Programming in C with MPI and OpenMP"	Michael J. Quinn	McGraw-Hill	International	2008

Online References:

S. No.	Website Name	URL	Modules Covered
1.	https://computing.llnl.gov	https://computing.llnl.gov/tutorials/parallel_comp/	M1 & M2
2.	https://www.techopedia.com	https://whatis.techtarget.com/definition/GPGPU-general-purpose-graphics-processing-unit https://www.techopedia.com/definition/32894/general-purpose-graphics-processing-unit-gpgpu	M6
3.	https://www.ee.ryerson.ca http://pages.tacc.utexas.edu	https://www.ee.ryerson.ca/~courses/ee8218/mpi_openmp.pdf http://pages.tacc.utexas.edu/~eijkhout/pcse/html/index.html	M5

B.E. Semester –VII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							B.E.SEM :VII		
Course Name :Software Testing and Quality Assurance							Course Code : ITDLO7034		
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory (100)		Practical/Oral (25)	Term Work (25)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	IA	ESE	PR	TW	
4	-	-	4	4	20	80	--	--	100
IA: In-Semester Assessment - Paper Duration – 1 Hours ESE: End Semester Examination - Paper Duration - 3 Hours **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Completion of Practical (40%) and Attendance/Learning Attitude (20%).									Timely
Prerequisite: Software Engineering Concept									

Course Objective: The course intends to deliver the fundamentals of software debugging methods, White box, Black Box testing techniques and apply various testing tools to analyze quality assurance models.

Course Outcomes:Upon completion of the course students will be able to:

S.No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Investigate the reason for bugs and analyze the principles in software testing to prevent and remove bugs.	L1,L2
2	Implement various test processes for quality improvement	L1,L2,L3,L4
3	Design test planning.	L1,L2,L3
4	Manage the test process	L1,L2,L3
5	Apply the software testing techniques in commercial environment	L1,L2,L3
6	Use practical knowledge of a variety of ways to test software and an understanding of some of the trade-offs between testing techniques.	L1,L2,L3,L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Testing Methodology** Introduction, Goals of Software, Testing, Software Testing Definitions, Model for Software Testing, Effective, Software Testing vs Exhaustive, Case Studies, Software Testing, Terminology, Software Testing Life, Cycle (STLC), Software Testing, methodology, Verification and Validation, Verification requirements, Verification of high level design, Verification low level design, validation	**09**	L1,L2

2	**Testing Techniques** Dynamic Testing: Black Box testing: Dynamic Testing: Black Box testing: boundary value analysis, equivalence class testing, state table based testing, Cause-effect graphing based testing, error guessing. White box Testing Techniques: need, logic coverage criteria, basis path testing, graph matrices, loop testing, data flow testing, mutation testing. Static Testing. Validation Activities: Unit validation, Integration, Function, System, Acceptance Testing. Regression Testing: Progressive vs. Regressive, regression testing produces quality software, regression testability, objectives of regression testing, Regression testing types, define problem, regression testing techniques.	**08**	L1,L2,L3,L4
3	**Managing the Test Process** Test Management: test organization, structure and of testing group, test planning, detailed test design and test specification. Software Metrics: need, definition and classification of software matrices. Testing Metrics for Monitoring and Controlling the Testing Process: attributes and corresponding metrics, estimation model for testing effort, architectural design, information flow matrix used for testing, function point and test point analysis. Efficient Test Suite Management : minimizing the test suite and its Benefits, test suite minimization problem, test suite prioritization its type, techniques and measuring effectiveness.	**08**	L1,L2,L3,L4
4	**Test Automation** Categorization, selection and cost in testing tool, guidelines for testing tools. Study of testing tools: JIRA, Bugzilla, TestDirector and IBM Rational Functional Tester, Selenium etc.	**09**	L1,L2,L3,L4,L5
5	**Testing for specialized environment** Agile Testing, Agile Testing Life Cycle, Testing in Scrum phases, Challenges in Agile Testing Testing Web based Systems: Web based system, web technology evaluation, traditional software and web based software, challenges in testing for web based software, testing web based testing	**08**	L1,L2,L3,L4,L5
6	**Quality Management** Software Quality Management, McCall's quality factors and Criteria, ISO 9126 quality characteristics, ISO9000:2000, Software quality management	**06**	L1,L2,L3
Total Hrs.		**48**	

Books and References:

S. No	Title	Authors	Publisher	Edition	Year
1	Software Testing Principles and Practices	Naresh Chauhan	Oxford Higher Education	illustrated	2010
2	Software Testing and quality assurance theory and practice	Kshirasagar Naik, PriyadarshiTripathy	Wiley Publication	1st	2010
3	Effective Methods for Software Testing	Willam E. Perry	Wiley Publication	3rd	2007
4	Software Testing Concepts and Tools	Nageswara Rao Pusuluri	Dreamtech press	1st	2008

Online References:

S. No.	Website Name	URL	Modules Covered
1.	https://www.guru99.com	https://www.guru99.com/software-testing-life-cycle.html	M1
2.	https://www.guru99.com	https://www.guru99.com/software-testing-life-cycle.html	M2
3.	https://www.guru99.com	https://www.guru99.com/software-testing-Method.html	M3
4.	https://www.guru99.com	https://www.guru99.com/software-testing-Managing the Test Process.html	M4
5.	https://www.guru99.com	https://www.guru99.com/software-testing-Test Automation.html	M5
6.	https://www.guru99.com	https://www.tutorialspoint.com/Testing for specialized environment.htm	M6

B.E. Semester –VII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							**B.E.SEM :** VII		
Course Name :Soft Computing							**Course Code :ITDLO7035**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	**100**
4	--	--	4	4	20	80	--	--	
IA: In-Semester Assessment - Paper Duration – 1 Hours **ESE: End Semester Examination - Paper Duration - 3 Hours** **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Completion of Practical (40%) and Attendance/Learning Attitude (20%). Timely									
Prerequisite: Probability and statistics, C++/Java/MATLAB programming									

Course Objective: The course intends to deliver the fundamentals of soft computing, fuzzy logic concepts, artificial neural network (ANN), and learning algorithms. Also to apply and anlyze Genetic Algorithm, function approximation for various application and optimization in soft computing.

Course Outcomes:Upon completion of the course students will be able to:

S. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	List the facts and outline the different process carried out in fuzzy logic, ANN and Genetic Algorithms.	L1,L2
2	Explain the concepts and meta-cognitive of soft computing.	L1,L2
3	Apply Soft computing techniques the solve character recognition, pattern classification, regression and similar problems.	L1,L2
4	Outline facts to identify process/procedures to handle real world problems using soft computing.	L1,L2,L3
5	Evaluate various techniques of soft computing to defend the best working solutions.	L1,L2,L3,L4
6	Design hybrid system to revise the principles of soft computing in various applications.	L1,L2,L3,L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Fuzzy Set Theory** Fuzzy Sets: Basic definition and terminology, Basic fuzzy sets,Fuzzy set operations, Fuzzy relations: Cardinality of fuzzy relations, operations on fuzzy relations, properties of fuzzy relations, Fuzzy composition Fuzzification and Defuzzification: Features of the membership Functions, Fuzzification,Lambda-Cuts for Fuzzy Sets, Lambda-Cuts for Fuzzy Relations, Defuzzification methods	06	L1,L2,L3

2	**Fuzzy Rules, Reasoning, and Inference System** Fuzzy Rules: Fuzzy If-Then Rules, Fuzzy Reasoning Fuzzy Inference System (FIS): Mamdani FIS, Sugeno FIS, Comparison between, Mamdani and Sugeno FIS.	**07**	L1,L2,L3,L4
3	**Neural Networks -I** Introduction: What is a Neural network? Fundamental Concepts, Basic Models of Artificial Neural Networks, Artificial Intelligence and Neural Networks, McCulloch-Pitts Neuron Learning: Error-Correction Learning, Memory based Learning, Hebbian learning, Competitive Learning Perceptron: Perceptron Learning Rule, Perceptron Learning Algorithm, Perceptron Perceptron learning and Non-separable sets.	**09**	L1,L2,L3,L4
4	**Neural Networks-II** Back propagation: Multilayered Network Architecture, Back propagation Algorithm, Practical Consideration in impin Implementing the Back propagation Algorithm. Back propagation and XOR problem. Adaptive resonance Theory: Noise-Saturation Dilemma, Solving the Noise-Saturation Dilemma, Recurrent On-center-Off-surround Networks, Building blocks of Adaptive Resonance, Substrate of resonance, Structural details of the resonance Model, Adaptive Resonance Theory I(ART Neurophysiological Evidence for ART Mechanism Character Recognition: Introduction, General Algorithm Architecture for Character Recognition: Binarization, Preprocessing, Filters, Smoothing, Skew Detection and Correction, Slant Correction, Character Normalization, Thinning, Segmentation, Multilingual OCR by Rule-Based Approach and ANN Rule-Based Approach: Classification, Tests, Rules Artificial Neural Network: Inputs, Outputs, Identification Results of Multilingual OCR	**10**	L1,L2,L3,L4
5	**Genetic Algorithm** An Introduction to genetic Algorithms: What Are Genetic Algorithms? Robustness of Traditional Optimization and Search Methods, The Optimization, How Are Genetic Algorithms Different from Traditional Methods?, A Simple Genetic Algorithm Genetic Algorithms at Work—a Simulation by hand, Grist for the Search Mill—Important Similarities, Similarity Templates (Schemata), Learning the Lingo. Genetic Algorithms: Mathematical Foundations Who Shall Live and Who Shall Die? The Fundamental Theorem, Schema Processing at Work: An Example by Hand Revisited, The Two-armed and й-armed Bandit Problem, How Many Schemata Are Processed Usefully? The Building Block Hypothesis, Another Perspective: The Minimal Deceptive Problem, Schemata Revisited: Similarity Templates as Hyperplanes, Implementation of a Genetic Algorithm: Data Structures, Reproduction, Crossover, and Mutation, A Time to Reproduce, a Time to Cross, Get with the Main Program, How Well Does it Work? Mapping Objective Functions to Fitness Form, Fitness Scaling, Codings, A Multiparameter, Mapped, Fixed-Point Discretization, Constraints. Algorithm for Handwriting Recognition Using GA Generation of Graph, Fitness Function of GA: Deviation between Two Edges, Deviation of a Graph, Crossover: Matching of Points, Generate Adjacency Matrix, Find Paths, Removing and Adding Edges, Generation of Graph Results of Handwriting Recognition: Effect of Genetic Algorithms, Distance Optimization, Style Optimization	**10**	L1,L2,L3,L4
6	**Hybrid Computing** Introduction, Neuro-Fuzzy Hybrid Systems, Adaptive Neuro-Fuzzy Inference System (ANIFS): Introduction, ANFS Architecture, Hybrid Algorithm, ANFIS as a Universal Approximator, Simulation Examples: Two-input Sinc Function and Three Input Nonlinear Function Genetic Neuro-Hybrid Systems: Properties of Genetic Neuro-Hybrid Systems, genetic Algorithm based Back-propagation Network, Advantages of Neuro-Genetic Hybrids, Genetic Fuzzy Hybrid and Fuzzy Genetic Hybrid Systems Genetic Fuzzy Rule based Systems, Advantages of Genetic Fuzzy Hybrids	**07**	L1,L2
Total Hrs.		**49**	

Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1	Principles of Soft Computing, Wiley India, 2007	S.N. Sivanandan and S.N. Deepa	Wiley India	2nd	2007
2	Neuro-Fuzzy and Soft Computing, A Computational Approach to Learning and Machine Intelligence	J.-S. R. Jang, C. –T. Sun, E. Mizutani,	PHI Learning Private Limited	1st	2014
3	Genetic Algorithms, in search, optimization and Machine Learning	David E. Goldberg,	Pearson	1st	1989
4	Real Life Applications of Soft Computing,	Anupam Shukla, Ritu Tiwari, Rahul Kala,	CRC Press, Taylor & Francis Group	1st	2010

Online Recourses:

S. No.	Website Name	URL	Modules covered
1.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/fuzzy_logic/fuzzy_logic_introduction	M1
2.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/fuzzy_logic/fuzzy_logic_inference_system.htm	M2
3.	https://becominghuman.ai	https://becominghuman.ai/artificial-neuron-networks-basics-introduction-to-neural-networks-3082f1dcca8c	M3
4.	http://neuralnetworksanddeeplearning.com	http://neuralnetworksanddeeplearning.com/chap1.html	M4
5.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/genetic_algorithms/genetic_algorithms_quick_guide	M5
6.	https://www.geeksforgeeks.org	https://www.geeksforgeeks.org/introduction-ann-artificial-neural-networks-set-3-hybrid-systems/	M6

B.E. Semester–VII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							B.E. SEM : VII		
Course Name :Product Life Cycle Management							Course Code : ILO 7011		
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory (100)		Practical/Oral (25)	Term Work (25)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	IA	ESE	PR/OR	TW	
3	-	-	3	3	20	80	-	-	100

IA: In-Semester Assessment - Paper Duration – 1 Hour
ESE: End Semester Examination - Paper Duration - 3 Hours
Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).

Prerequisite: Database Design and Management

Course Objective: TheCourse should be able toprovide an exposure to new product development program and guidelines for designing and developing a product and apply the knowledge of Product Data Management & PLM strategies.

Course Outcomes: Upon completion of the course students will be able to:

S. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Illustrate knowledge about phases of PLM, PLM strategies and methodology for PLM feasibility study and PDM implementation	L1, L2
2	Illustrate various approaches and techniques for designing and developing products.	L1,L2
3	Apply product engineering guidelines / thumb rules in designing products for moulding, machining, sheet metal working etc	L1, L2, L3
4	Acquire knowledge in applying virtual product development tools for components, machining and manufacturing plant	L1, L2, L3
5	Apply Integration of Environmental Aspects in Product Design	L1, L2, L3
6	Illustrate knowledge about Life Cycle Assessment and Life Cycle Cost Analysis	L1, L2

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction to Product Lifecycle Management (PLM) and PLM Strategies** Product Lifecycle Management (PLM), Need for PLM, Product Lifecycle Phases, Opportunities of Globalization, Pre-PLM Environment, PLM Paradigm, Importance & Benefits of PLM, Widespread Impact of PLM, Focus and Application, A PLM Project, Starting the PLM Initiative, PLM Applications Industrial strategies, Strategy elements, its identification, selection and implementation, Developing PLM Vision and PLM Strategy , Change management for PLM	10	L1, L2
	Product Design		

2	Product Design: Product Design and Development Process, Engineering Design, Organization and Decomposition in Product Design, Typologies of Design Process Models, Reference Model, Product Design in the Context of the Product Development Process, Relation with the Development Process Planning Phase, Relation with the Post design Planning Phase, Methodological Evolution in Product Design, Concurrent Engineering, Characteristic Features of Concurrent Engineering, Concurrent Engineering and Life Cycle Approach, New Product Development (NPD) and Strategies, Product Configuration and Variant Management, The Design for X System, Objective Properties and Design for X Tools, Choice of Design for X Tools and Their Use in the Design Process	9	L1, L2
3	**Product Data Management (PDM)** Product Data Management (PDM):Product and Product Data, PDM systems and importance, Components of PDM, Reason for implementing a PDM system, financial justification of PDM, barriers to PDM implementation	5	L1, L2, L3
4	**Virtual Product Development Tools** Virtual Product Development Tools: For components, machines, and manufacturing plants, 3D CAD systems and realistic rendering techniques, Digital mock-up, Model building, Model analysis, Modeling and simulations in Product Design, Examples/Case studies	5	L1, L2, L3
5	**Integration of Environmental Aspects in Product Design** Integration of Environmental Aspects in Product Design: Sustainable Development, Design for Environment, Need for Life Cycle Environmental Strategies, Useful Life Extension Strategies, End-of-Life Strategies, Introduction of Environmental Strategies into the Design Process, Life Cycle Environmental Strategies and Considerations for Product Design	5	L1, L2, L3
6	**Life Cycle Assessment and Life Cycle Cost Analysis** Life Cycle Assessment and Life Cycle Cost Analysis: Properties, and Framework of Life Cycle Assessment, Phases of LCA in ISO Standards, Fields of Application and Limitations of Life Cycle Assessment, Cost Analysis and the Life Cycle Approach, General Framework for LCCA, Evolution of Models for Product Life Cycle Cost Analysis.	5	L1, L2
	Total Hours	**39**	

Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1.	Product Lifecycle Management: Paradigm for 21st Century Product Realisation	John Stark	Springer-Verlag	6th	2004
2.	Product Design for the environment-A life cycle approach	Fabio Giudice, Guido La Rosa, Antonino Risitano	Taylor & Francis	10th	2006
3.	Product Life Cycle Management	Saaksvuori Antti, ImmonenAnselmie	Springer, Dreamtech	10th	
4.	Product Lifecycle Management: Driving the next generation of lean thinking	Michael Grieve	Tata McGraw-Hill,		2006

Online References:

S. No.	Website Name	URL	Modules Covered
1.	www.nptel.ac.in	https://nptel.ac.in/courses/110104070/9	M1-M6
2.	www.amieindia.in	https://www.amieindia.in/study-materials/product-life-cycle.pdf	M1, M5, M6

B.E. Semester –VII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Electronics Engineering)							**B.E. SEM:VII**				
Course Name:Reliability Engineering							**Course Code:ILO7012**				
Teaching Scheme (Program Specific)					**Examination scheme**						
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**						
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**		**Term Work (25)**		**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**		**TW**		**100**
3	-	-	3	3	20	80	-	-	-	-	
IA : Internal Assessment - Paper Duration – **1Hour** **ESE :** - End Semester Examination Paper Duration - **3 Hours** **The weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely completion of practical (40%) and Attendance (20%)											
Prerequisite: Signals and Systems, Control systems											

Course Objective: To impart various aspects of probability theory, system reliability, and maintainability, availability and FMEA procedure.

Course Outcomes:Upon completion of the course students will be able to:

SN	Course Outcomes	Cognitive levels of attainment as per bloom's Taxonomy
1	Understand and apply the concept of Probability to engineering problems	L1,L2,L3
2	Apply various reliability concepts to calculate different reliability parameters	L1,L2,L3,L4
3	Estimate the system reliability of simple and complex systems	L1,L2,L3
4	Carry out a Failure Mode Effect and Criticality Analysis	L1,L2,L3,L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per bloom's Taxonomy
1	Probability theory Probability: Standard definitions and concepts; ConditionalProbability, Baye's Theorem. Probability Distributions: Central tendency and Dispersion; Binomial, Normal, Poisson, Weibull, Exponential, relations between them and their significance. Measures of Dispersion: Mean, Median, Mode, Range, Mean Deviation, Standard Deviation, Variance, Skewness and Kurtosis.	08	L1, L2, L3
2	Reliability Concepts Reliability Concepts: Reliability definitions, Importance of Reliability, Quality Assurance and Reliability, Bath Tub Curve. Failure Data Analysis: Hazard rate, failure density, Failure Rate, Mean Time To Failure (MTTF), MTBF, Reliability Functions. Reliability Hazard Models: Constant Failure Rate, Linearly increasing, Time Dependent Failure Rate, Weibull Model. Distribution functions and reliability analysis.	08	L1,L2,L3

3	System Reliability: System Reliability: System Configurations: Series, parallel, mixed configuration, k out of n structure, Complex systems	05	L1,L2,L3,L4
4	Reliability Improvement: Reliability Improvement: Redundancy Techniques: Element redundancy, Unit redundancy, Standby redundancies. Markov analysis. System Reliability Analysis – Enumeration method, Cut-set method, Success, Path method, Decomposition method.	08	L1,L2
5	Maintainability and Availability Maintainability and Availability: System downtime, Design for Maintainability: Maintenance requirements, Design methods: Fault Isolation and self-diagnostics, Parts standardization and Interchangeability, Modularization and Accessibility, Repair Vs Replacement. Availability – qualitative aspects.	05	L1,L2,L3
6	**Failure Mode, Effects and Criticality Analysis:** Failure mode effects analysis: severity/criticality analysis, FMECA examples. Fault tree construction, basic symbols, development of functional reliability block diagram, Fau1t tree analysis and Event tree Analysis	05	L1,L2
	Total Hrs.	39	

Books and References:

S. No	Title	Authors	Publisher	Edition	Year
1	Reliability Engineering",	L.S. Srinath,	"Affiliated East-Wast Press (P) Ltd	3rdEdition	1985
2	"Reliability and Maintainability Engineering	Charles E. Ebeling	Tata McGraw Hill.	4th Edition	2015
3	Engineering Reliability	B. S. Dhillion C. Singh,	John Wiley & Sons	5th edition	1980
4	Practical Reliability Engg.",	P.D.T. Conor	John Wiley & Sons	3rd Edition	1985.
5.	Reliability in Engineering Design	K.C. Kapur, L.R. Lamber son	John Wiley & Sons.	3rdEdition	1989
6.	Probability and Statistics	Murray R. Spiegel	Tata McGraw-Hill Publishing Co. Ltd.	5th edition	1980

B.E. Semester–VII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							**B.E. SEM : VII**		
Course Name : Institute Level Optional Course-I(Management Information System)							**Course Code :**ILO7013		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR/OR**	**TW**	**100**
3	-	-	3	3	20	80	-	-	
IA: In-Semester Assessment - Paper Duration – 1 Hour **ESE: End Semester Examination - Paper Duration - 3 Hours**									
Prerequisite: Database Design and Management									

Course Objective: The course intends to deliver the role of Management in Information Systems & to understand the impact of these systems within an Organization to improve business performance and decision making. It analyzes typical functional information systems, principal tools and technologies for accessing information from databases & interpreting Ethical issues & Privacy for the same.

Course Outcomes: Upon completion of the course students will be able to:

Sr. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Explain how information systems Transform Business	L1, L2
2	Understand about Data and Knowledge Management	L1, L2, L3
3	Analyze the Ethical issues and Privacy in Information Systems	L1, L2, L3, L4
4	Understand the principal tools and technologies for accessing information from databases to improve business performance and decision making	L1, L2, L3
5	Analyze the types of systems used for enterprise-wide knowledge management and how they provide value for businesses	L1, L2, L3, L4
6	Analyze the impact of information systems have on an organization	L1, L2, L3, L4

Detailed Syllabus:

Module No.	Topics	Hrs	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction To Information Systems (IS)** Computer Based Information Systems, Impact of IT on organizations, Importance of IS to Society. Organizational Strategy, Competitive Advantages and IS	4	L1, L2
2	**Data and Knowledge Management** Database Approach, Big Data, Data warehouse and Data Marts, Knowledge Management Business intelligence (BI): Managers and Decision Making, BI for Data analysis and Presenting Results	7	L1, L2, L3
3	**Ethical issues and Privacy** Information Security. Threat to IS, and Security Controls	7	L1, L2, L3, L4
	Social Computing (SC)		

4	Web 2.0 and 3.0, SC in business-shopping, Marketing, Operational and Analytic CRM, E-business and E-commerce – B2B B2C. Mobile commerce.	7	L1, L2, L3
5	**Wired and Wireless Technology** Computer Networks Wired and Wireless Technology, Pervasive computing, Cloud computing model.	6	L1, L2, L3, L4
6	**Information System within Organization** Transaction Processing Systems, Functional Area Information System, ERP and ERP support of Business Process. Acquiring Information Systems and Applications: Various System development life cycle models	8	L1, L2, L3, L4
	Total Hours	**39**	

Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
3.	Management Information Systems	Kelly Rainer, Brad Prince	Wiley	6th	2011
4.	Management Information Systems	K.C. Laudon and J.P. Laudon	Prentice Hall	10th	2007
3.	Managing Information Systems: Strategy and Organization	D. Boddy, A. Boonstra	Prentice Hall	10th	2008

Online References:

S. No.	Website Name	URL	Modules Covered
1.	https://www.tutorialspoint.com/index.htm	https://www.tutorialspoint.com/management_information_system/	M1
2.	https://www.tutorialspoint.com/index.htm	https://www.tutorialspoint.com/management_information_system/information_need_objective.htm	M2
3.	https://www.tutorialspoint.com/index.htm	https://www.tutorialspoint.com/management_information_system/mis_security_and_ethical_issues.htm	M3
4.	https://www.tutorialspoint.com/index.htm	https://www.tutorialspoint.com/management_information_system/system_development_life_cycle.htm	M4
5.	https://pressbooks.com/	https://bus206.pressbooks.com/chapter/chapter-13-future-trends-in-information-systems/	M5
6.	https://www.tutorialspoint.com/index.htm	https://www.tutorialspoint.com/management_information_system/business_continuity_planning.htm	M6

Semester –VII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							**B. E. (SEM :**VII)		
Course Name : Design of Experiments							**Course Code :**ILO 7014		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory**		**Practical/Oral**	**Term Work**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	**100**
3	-	-	3	3	20	80	-	-	

IA: Internal Assessment - Paper Duration – 1 Hour
ESE: End Semester Examination - Paper Duration - 3 Hours
The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance/Learning Attitude (20%)

Prerequisite:

Course Objective: The course intends to provide understanding of issues and principles of Design of Experiments (DOE) and list the guidelines for designing experiments to become familiar with methodologies that can be used in conjunction with experimental designs for robustness and optimization

Course Outcomes: Upon completion of the course students will be able to:

S.No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Plan data collection, to turn data into information and to make decisions that lead to appropriate action	L1, L2, L3, L4
2	Apply the methods taught to real life situations	L1, L2, L3, L4
3	Plan, analyze, and interpret the results of experiments	L1, L2, L3, L4

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction** Strategy of Experimentation, Typical Applications of Experimental Design, Guidelines for Designing Experiments, Response Surface Methodology	6	L1
2	**Fitting Regression Models** Linear Regression Models, Estimation of the Parameters in Linear Regression Models, Hypothesis Testing in Multiple Regression, Confidence Intervals in Multiple Regression, Prediction of new response observation, Regression model diagnostics, Testing for lack of fit.	8	L1, L2, L3, L4
3	**Two-Level Factorial Designs** The 2^2 Design, The 2^3Design , The General 2k Design, A Single Replicate of the 2k Design, The Addition of Center Points to the 2k Design, Blocking in the 2k Factorial Design Split-Plot Designs	7	L1, L2, L3, L4

4	**Two-Level Fractional Factorial Designs** The One-Half Fraction of the 2k Design, The One-Quarter Fraction of the 2k Design, The General 2k-p Fractional Factorial Design, Resolution III Designs, Resolution IV and V Designs, Fractional Factorial Split-Plot Designs	7	L1, L2, L3, L4
5	**Response Surface Methods and Designs** Introduction to Response Surface Methodology, The Method of Steepest Ascent, Analysis of a Second-Order Response Surface, Experimental Designs for Fitting Response Surfaces	7	L1, L2, L3, L4
6	**Taguchi Approach** Crossed Array Designs and Signal-to-Noise Ratios, Analysis Methods, Robust design examples	4	L1, L2, L3, L4
	Total Hours	**39**	

Books and References:

S.No.	Title	Authors	Publisher	Edition	Year
1	Response Surface Methodology: Process and Product Optimization using Designed Experiment	Raymond H. Mayers, Douglas C. Montgomery, Christine M. Anderson-Cook	Wiley & Sons	3rd	2001
2	Design and Analysis of Experiment	D.C. Montgomery	John Wiley & Sons	5th	2001
3	Statics for Experimenters: Design, Innovation and Discovery,.	George E P Box, J Stuart Hunter, William G Hunter	Wiley	2nd	2005

Online Resources:

S. No.	Website Name	URL	Modules Covered
1	https://www2.isye.gatech.edu	https://www2.isye.gatech.edu/~yxie77/isye2028/lecture12.pdf	M1, M2
2	http://reliawiki.org	http://reliawiki.org/index.php/Multiple_Linear_Regression_Analysis	M2
3	https://www.stat.washington.edu	https://www.stat.washington.edu/pds/stat502/LectureNotes/2k.factorial.intro.pdf www.math.montana.edu/jobo/st578/sec6.pdf	M3,M5
4	https://www2.isye.gatech.edu	https://www2.isye.gatech.edu/~jeffwu/isye6413/unit_08_12spring.pdf	M6

B.E. Semester–VII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							**B.E. SEM :VII**		
Course Name :Operation Research							**Course Code :ILO7015**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	
3	-			4	20	80	--	--	**100**

IA: In-Semester Exam- Paper Duration – 1 Hours

ESE : End Semester Exam- Paper Duration - 3 Hours

Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).

Prerequisite: Basic Design Concepts and theories of failure.

Course Objective: The course intends to impart the optimization techniques for efficient management in industries.

Course Outcomes: Upon completion of the course students will be able to:

SN	Course Outcomes	Cognitive levels of attainment as per bloom's Taxonomy
1	Understand the theoretical workings of the simplex method, the relationship between a linear program and its dual, including strong duality and complementary slackness.	L1 , L2 , L3
2	Perform sensitivity analysis to determine the direction and magnitude of change of a model's optimal solution as the data change	L1 , L2 , L3
3	Solve specialized linear programming problems like the transportation and assignment problems, solve network models like the shortest path, minimum spanning tree, and maximum flow problems	L1 , L2 , L3
4	Understand the applications of integer programming and a queuing model and compute important performance measures	L1 , L2 , L3
5	T o apply conflict between two players	L1 , L2 , L3
6	To apply EOQ model in inventory	L1 , L2 , L3

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per bloom's Taxonomy
1	**Introduction to Operations Research** Introduction, , Structure of the Mathematical Model, Limitations of Operations Research **Linear Programming**: Introduction, Linear Programming Problem, Requirements of LPP, Mathematical Formulation of LPP, Graphical method, Simplex Method Penalty Cost Method or Big M-method, Two Phase Method, Revised simplex method, **Duality**, Primal – Dual construction, Symmetric and Asymmetric Dual, Weak Duality Theorem,	14	L1 , L2 , L3

	Complimentary Slackness Theorem, Main Duality Theorem, Dual Simplex Method, Sensitivity Analysis **Transportation Problem**: Formulation, solution, unbalanced Transportation problem. Finding basic feasible solutions – Northwest corner rule, least cost method and Vogel's approximation method. Optimality test: the stepping stone method and MODI method **Assignment Problem** Introduction, Mathematical Formulation of the Problem, Hungarian Method Algorithm, Processing of n Jobs Through Two Machines and m Machines, Graphical Method of Two Jobs m Machines Problem Routing Problem, Travelling Salesman Problem **Integer Programming Problem** Introduction, Types of Integer Programming Problems, Gomory's cutting plane Algorithm, Branch and Bound Technique. Introduction to Decomposition algorithms.		
2	**Queuing models**: queuing systems and structures, single server and multi-server models, Poisson input, exponential service, constant rate service, finite and infinite population	05	L1 , L2 , L3
3	**Simulation:** Introduction, Methodology of Simulation, Basic Concepts, Simulation Procedure, Application of Simulation Monte-Carlo Method: Introduction, Monte-Carlo Simulation, Applications of Simulation, Advantages of Simulation, Limitations of Simulation	05	L1 , L2 , L3
4	**Dynamic programming.** Characteristics of dynamic programming. Dynamic programming approach for Priority Management employment smoothening, capital budgeting, Stage Coach/Shortest Path, cargo loading and Reliability problems.	05	L1 , L2 , L3
5	**Game Theory.** Competitive games, rectangular game, saddle point, minimax (maximin) method of optimal strategies, value of the game. Solution of games with saddle points, dominance principle. Rectangular games without saddle point – mixed strategy for 2 X 2 games.	05	L1 , L2 , L3
6	**Inventory Models** Classical EOQ Models, EOQ Model with Price Breaks, EOQ with Shortage, Probabilistic EOQ Model,	05	L1 , L2 , L3
	Total Hrs.	39	

Books and References:

S.No.	Title	Authors	Publisher	Edition	Year
1	Operations Research - An Introduction	Taha, H.A.	Prentice Hall,	7th Edition,	2002
2	Operations Research: Principles and Practice",	Ravindran, A, Phillips	John Willey and Sons	2nd Edition -	2009
3	Introduction to Operations Research	Hiller, F. S. and Liebermann	McGraw Hill	-	-
4	Operations Research	S. D. Sharma	KedarNath Ram Nath-Meerut	-	-

B.E. Semester–VII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							**B.E. SEM :VII**		
Course Name :Cyber Security and Laws							**Course Code :ILO7016**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	**100**
3	-	-	3	3	20	80	--	--	
IA: In-Semester Exam- Paper Duration – 1 Hours **ESE : End Semester Exam- Paper Duration - 3 Hours** **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).									
Prerequisite: Cryptography and network security									

Course Objective: The Course intends to deliver the fundamentals of cyber law, intellectual property, cybercrimes, trademarks, domain theft, tools used in cyber security and analyze security policies, protocols applied in Indian IT Act 2008, security standards compliances.

Course Outcomes:Upon completion of the course students will be able to:

S.No.	Course Outcomes	Cognitive levels of attainment as per bloom's Taxonomy
1	Understand the concept of cybercrime and its effect on outside world	L1,L2
2	Interpret and apply IT law in various legal issues , Analyze security challenges and issues	L1,L2,L3
3	Understand and analyze various attack using tools like wire shark , key logger etc	L1,L2
4	Distinguish different aspects of cyber law	L1,L2,L3,L4
5	Study India IT Act and analyze different case studies	L1,L2,L3,L4
6	Apply Information Security Standards compliance during software design and development	L1,L2,L3,L4

Detailed Syllabus:

Module No.	Topics	Hrs	Cognitive levels of attainment as per bloom's Taxonomy
1	**Introduction to Cybercrime:**	**5**	L1,L2
	Introduction to Cybercrime: Cybercrime definition and origins of the world, Cybercrime and information security, Classifications of cybercrime, Cybercrime and the Indian ITA 2000, A global Perspective on cybercrimes.		
2	**Cyber offenses & Cybercrime:**	**10**	L1,L2
	Cyber offenses & Cybercrime: How criminal plan the attacks, Social Engg, Cyber stalking, Cyber café and Cybercrimes, Bot nets, Attack vector, Cloud computing, Proliferation of Mobile and Wireless Devices, Trends in Mobility, Credit Card Frauds in Mobile and Wireless Computing Era, Security Challenges Posed by Mobile Devices, Registry Settings for Mobile Devices, Authentication Service Security, Attacks on Mobile/Cell Phones, Mobile Devices: Security Implications for Organizations, Organizational Measures for Handling Mobile, Devices-Related Security Issues, Organizational Security Policies and Measures in Mobile Computing Era, Laptops		
3	**Tools and Methods Used in Cyber line**	**7**	L1,L2
	Phishing, Password Cracking, Key loggers and Spywares, Virus and Worms, Steganography, DoS and DDoS Attacks, SQL Injection, Buffer Over Flow, Attacks on Wireless Networks, Phishing, Identity Theft (ID Theft)		
4	**The Concept of Cyberspace**	**9**	L1,L2,L3,L4
	E-Commerce , The Contract Aspects in Cyber Law ,The Security Aspect of Cyber Law ,The Intellectual Property Aspect in Cyber Law , The Evidence Aspect in Cyber Law , The Criminal Aspect in Cyber Law,Global Trends in Cyber Law , Legal Framework for Electronic Data Interchange Law Relating to Electronic Banking , The Need for an Indian Cyber Law		
5	**Indian IT Act.**	**7**	L1,L2,L3,L4
	Cyber Crime and Criminal Justice: Penalties, Adjudication and Appeals Under the IT Act, 2000, IT Act. 2008 and its Amendments		
6	**Information Security Standard compliances**	7	L1,L2,L3,L4
	SOX, GLBA, HIPAA, ISO, FISMA, NERC, PCI.		
Total Hrs.		**45**	

Books and References:

Sr. No	Title	Authors	Publisher	Edition	Year
1	Cyber Security	Nina Godbole, SunitBelapure	Wiley India , New Delhi	2nd	2011
2	The Indian Cyber Law	Suresh T. Vishwanathan	Bharat Law House, New Delhi	2nd	2015
3	Cyber Law & Cyber Crimes	Advocate Prashant Mali	Snow White Publications, Mumbai	2nd	2015
4	Information Systems Security	Nina Godbole	Wiley India, New Delhi	2nd	2014
5	Cyber Security &Global Information Assurance	Kennetch J. Knapp	Information Science Publishing.	1st	2009

Online References:

S.No.	Website Name	URL	Modules covered
7.	http://www.cyberralegalservices.com	http://www.cyberralegalservices.com/detail-casestudies.php	M1
8.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/information_security_cyber_law/offences_and_penalties	M2
9.	https://www.educba.com	https://www.educba.com/32-most-important-cyber-security-tools/	M3
10.	https://www.itu.int	https://www.itu.int/en/ITU-D/Cybersecurity/Documents/Introduction%20to%20the%20Concept%20of%20IT%20Security.pdf	M4
11.	https://www.tutorialspoint.com	https://www.tutorialspoint.com/information_security_cyber_law/information_technology_act.htm	M5
12.	https://www.cimcor.com	https://www.cimcor.com	M6

B.E. Semester–VII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							B.E. SEM :VII		
Course Name :Disaster Management and Mitigation Measures							Course Code :ILO7017		
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory (100)		Practical/Oral (25)	Term Work (25)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	IA	ESE	PR	TW	
3	-	-	3	3	20	80	--	--	100

IA: In-Semester Exam- Paper Duration – 1 Hours

ESE : End Semester Exam- Paper Duration - 3 Hours

Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).

Prerequisite:

Course Objective: The course intends to provide understanding of causes of different types of disasters, mitigation /rehabilitation measures and existing government policies and agencies.

Course Outcomes: Upon completion of the course students will be able to:

S.No.	Course Outcomes	Cognitive levels of attainment as per bloom's Taxonomy
1	Get to know natural as well as manmade disaster and their extent and possible effects on the economy.	L1
2	Plan of national importance structures based upon the previous history.	L1
3	Get acquainted with government policies, acts and various organizational structure associated	L1
4	Get to know the simple do's and don'ts in such extreme events and act accordingly.	L1

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Introduction**	**03**	L1
	Definition of Disaster, hazard, global and Indian scenario, generalperspective, importance of study in human life, Direct and indirecteffects of disasters, long term effects of disasters. Introduction to global warming and climate change		
2	**Natural Disaster and Manmade disasters**	**09**	L1
	Natural Disaster: Meaning and nature of natural disaster, Flood,Flash flood, drought, cloud burst, Earthquake, Landslides,Avalanches, Volcanic eruptions, Mudflow, Cyclone, Storm, StormSurge, climate change, global warming, sea level rise, ozonedepletion, Manmade Disasters: Chemical, Industrial, Nuclear and Fire Hazards.Role of growing population and subsequent industrialization,urbanization and changing lifestyle of human beings in frequentoccurrences of manmade disasters		

3	**Disaster Management, Policy and Administration**	**06**	
	Disaster management: meaning, concept, importance, objective ofdisaster management policy, disaster risks in India, Paradigm shift indisaster management **Policy and administration:** Importance and principles of disaster management policies, commandand co-ordination of in disaster management, rescue operations-howto start with and how to proceed in due course of time, study offlowchart showing the entire process.		L1
4	**Institutional Framework for Disaster Management in India**	**06**	
	Importance of public awareness, Preparation and execution of emergency management program. Scope and responsibilities of National Institute of Disaster Management (NIDM) and National disaster management authority (NDMA) in India. Methods and measures to avoid disasters, Management of casualties, set up of emergency facilities, importance of effective communication amongst different agencies in such situations. Use of Internet and software for effective disaster management. Applications of GIS, Remote sensing and GPS in this regard.		L1
5	**Financing Relief Measures**	**09**	
	Ways to raise finance for relief expenditure, role of government agencies and NGO‘s in this process, Legal aspects related to finance raising as well as overall management of disasters. Various NGO‘s and the works they have carried out in the past on the occurrence of various disasters, Ways to approach these teams. International relief aid agencies and their role in extreme events.		L1
6	**Preventive and Mitigation Measures**	**06**	
	Pre-disaster, during disaster and post-disaster measures in some events in general. Structural mapping: Risk mapping, assessment and analysis, sea walls and embankments, Bio shield, shelters, early warning and communication. Non Structural Mitigation: Community based disaster preparedness, risk transfer and risk financing, capacity development and training, awareness and education, contingency plans .Do‘s and don‘ts in case of disasters and effective implementation of relief aids.		L1
	Total	**39**	

Books and References:

S.No.	Title	Authors	Publisher	Year
1	Disaster Management	Harsh K.Gupta	Universities Press Publications	2003
2	Disaster Management: An Appraisal of Institutional Mechanisms in India	O.S.Dagur	Centre for land warfare studies	2011
3	Introduction to International Disaster Management	Damon Copolla	Butterworth Heinemann Elsevier Publications	2006
4	Disaster Management Handbook	Jack Pinkowski	CRC Press Taylor and Francis group	2008
5	Disaster management & rehabilitation	RajdeepDasgupta	Mittal Publications	2007
6	Natural Hazards and Disaster Management, Vulnerability and Mitigation	R B Singh	Rawat Publications	2006
7	Concepts and Techniques of GIS	C.P.Lo Albert, K.W. Yonng	Prentice Hall (India) Publications.	2006

B.E. Semester – VII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							B.E. SEM :VII		
Course Name: Energy Audit and Management							Course Code: ILO7018		
Teaching Scheme (Program Specific)					Examination Scheme Formative/Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory		Practical/Oral	Term Work	Total
Theory	Tutorial	Practical	Contact Hours	Credit	IA	ESE	PR	TW	100
3	-	-	3	3	20	80	-	-	

IA: Internal Assessment - Paper Duration – 1 Hour
ESE: End Semester Examination - Paper Duration - 3 Hours
The weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely completion of practical (40%) and Attendance/Learning Attitude (20%)

Course Objective: The course intends to provide understanding of unwanted source of energy and remedial measures for Energy Conservation through Energy Audit. In addition, subject analyses and highlights the detailed audit procedures of various energy generation plants & establishments, Govt initiatives and bodies associated with Electrical Energy Management.

Course Outcomes: Upon completion of the course students will be able to:

S.No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	To identify and describe present state of energy conservation, security and its importance.	L1, L2
2	To identify and describe the basic principles and methodologies adopted in energy audit of energy generation establishment/plants.	L1, L2, L3, L4
3	To describe the energy performance evaluation of some common electrical installations and identify the energy saving opportunities	L1, L2, L3, L4, L5
4	To describe the energy performance evaluation of some common thermal installations and identify the energy saving opportunities	L1, L2, L3, L4, L5
5	To analyze the data collected during performance evaluation and recommend energy saving measures	L1, L2, L3, L4, L5, L6

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	**Energy Scenario**	**05**	L1
	Present Energy Scenario, Energy Pricing, Energy Sector Reforms, Energy Security, Energy Conservation and its Importance, EnergyConservationAct-2001 and its Features. Basics of Energy and itsvarious forms, Material and Energy balance		
2	**Energy Audit Principles**	**08**	L1, L2, L3
	Definition, Energy audit- need, Types of energy audit, Energy management (audit) approach-understanding energy costs, Benchmarking, Energy performance, Matching energy use to requirement ,Maximizing system efficiencies, Optimizing the input energy requirements, Fuel and energy substitution. Elements of monitoring & targeting; Energy audit Instruments; Data and information-analysis. Financial analysis techniques: Simple payback period, NPV, Return on investment (ROI), Internal rate of return (IRR)		
3	**Energy Management and Energy Conservation in Electrical System**	**05**	L1, L2, L3, L4

	Electricity billing, Electrical load management and maximum demand Control; Power factor improvement, Energy efficient equipment's and appliances, star ratings. **Energy efficiency measures in lighting system, Lighting control:** Occupancy sensors, daylight integration, and use of intelligent controllers. **Energy conservation opportunities in**: water pumps, industrial drives, induction motors, motor retrofitting, soft starters, variablespeed drives.		
4	**Energy Management and Energy Conservation in ThermalSystems**	**08**	
	Review of different thermal loads; Energy conservation opportunitiesin: Steam distribution system, Assessment of steam distributionlosses, Steam leakages, Steam trapping, Condensate and flash steamrecoverysystem.General fuel economy measures in Boilers and furnaces, Waste heatrecovery, use of insulation- types and application. HVAC system: Coefficient of performance, Capacity, factors affecting Refrigerationand Air Conditioning system performance and savings opportunities.		L1, L2, L3, L4
5	**Energy Performance Assessment**	**07**	
	On site Performance evaluation techniques, Case studies based on: Motors and variable speed drive, pumps, HVAC system calculations; Lighting System: Installed Load Efficacy Ratio (ILER) method, Financial Analysis.		L1, L2, L3, L4, L5
6	**Energy conservation in Buildings**	**06**	
	Energy Conservation Building Codes (ECBC): Green Building,LEED rating, Application of Non-Conventional and RenewableEnergy Sources		L1, L2, L3, L4, L5
	Total	**39**	

Books & References:

S. No.	Title	Authors	Publisher	Year
1	Handbook of Electrical Installation Practice	Geofry Stokes,	Blackwell Science	2003
2	Designing with light: Lighting Handbook	Anil Valia	Lighting System	2010
3	Energy Management Handbook	W.C. Turner	John Wiley and Sons	2007
4	Handbook on Energy Audits and Management	Edited by A. K. Tyagi	Tata Energy Research Institute (TERI).	2017
5	Energy Management Principles	C.B.Smith	Pergamon Press	2015
6	Energy Conservation Guidebook	Dale R. Patrick, S. Fardo, Ray E. Richardson	Fairmont Press	2015
7	Handbook of Energy Audits	Albert Thumann, W. J. Younger, T. Niehus,	CRC Press	2017

Online References:

S. No.	Website Name	URL	Modules Covered
1	energymanagertraining	www.energymanagertraining.com	M3
2	bee-india.nic	www.bee-india.nic.in	M2

B.E. Semester–VII
Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							B.E. SEM : VII		
Course Name :Development Engineering							Course Code :ILO7019		
Teaching Scheme (Program Specific)					Examination Scheme (Formative/ Summative)				
Modes of Teaching / Learning / Weightage					Modes of Continuous Assessment / Evaluation				
Hours Per Week					Theory (100)		Practical/Oral (25)	Term Work (25)	Total
Theory	Tutorial	Practical	Contact Hours	Credits	IA	ESE	PR/OR	TW	
3	-	-	3	3	20	80	-	-	100
IA: In-Semester Assessment - Paper Duration – 1 Hour ESE: End Semester Examination - Paper Duration - 3 Hours									
Prerequisite: Database Design and Management									

Course Objectives:
Course intend deliver introduction to characteristics of rural Society and the Scope, Nature and Constraints of rural Development & exploration of human values 'good' professional, a 'good' society and a 'good life' in the context of work life and the personal life of modern Indian professionals.

Course Outcomes: Upon completion of the course students will be able to:

S. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Apply knowledge for Rural Development.	L1, L2
2	Apply knowledge for Management Issues..	L1,L2
3	Apply knowledge for Initiatives and Strategies	L1, L2, L3
4	Develop acumen for higher education and research.	L1, L2, L3
5	Master the art of working in group of different nature.	L1, L2, L3
6	Develop confidence to take up rural project activities independently	L1, L2

Detailed Syllabus:

Module No.	Topics	Hrs.	Cognitive levels of attainment as per Bloom's Taxonomy
1	Introduction to Rural Development Introduction to Rural Development Meaning, nature and scope of development; Nature of rural society in India; Hierarchy of settlements; Social, economic and ecological constraints for rural development Roots of Rural Development in India Rural reconstruction and Sarvodaya programme before independence; Impact of voluntary effort and Sarvodaya Movement on rural development; Constitutional direction, directive principles; Panchayati Raj - beginning of planning and community development; National extension services.	10	L1, L2
2	Rural Development Initiatives Post-Independence rural Development Balwant Rai Mehta Committee - three tier system of rural local Government; Need and scope for people's participation and Panchayati Raj; Ashok Mehta Committee - linkage between Panchayati Raj, participation and rural development	9	L1, L2

3	Rural Development Initiatives . Rural Development Initiatives in Five Year Plans Five Year Plans and Rural Development; Planning process at National, State, Regional and District levels; Planning, development, implementing and monitoring organizations and agencies; Urban and rural interface - integrated approach and local plans; Development initiatives and their convergence; Special component plan and sub-plan for the weaker section; Micro-eco zones; Data base for local planning; Need for decentralized planning; Sustainable rural development.	7	L1, L2, L3
4	**Amendments** Post 73rd Amendment Scenario 73rd Constitution Amendment Act, including - XI schedule, devolution of powers, functions and finance; Panchayati Raj institutions - organizational linkages; Recent changes in rural local planning; Gram Sabha - revitalized Panchayati Raj; Institutionalization; resource mapping, resource mobilization including social mobilization; Information Technology and rural planning; Need for further amendments.	7	L1, L2, L3
5	Values and Science and Technology Values and Science and Technology Material development and its values; the challenge of science and technology; Values in planning profession, research and education. Types of Values Psychological values — integrated personality; mental health; Societal values — the modern search for a good society; justice, democracy, rule of law, values in the Indian constitution; Aesthetic values — perception and enjoyment of beauty; Moral and ethical values; nature of moral judgment; Spiritual values; different concepts; secular spirituality; Relative and absolute values; Human values— humanism and human values; human rights; human values as freedom, creativity, love and wisdom.	6	L1, L2, L3
6	Ethics Ethics Canons of ethics; ethics of virtue; ethics of duty; ethics of responsibility; Work ethics; Professional ethics; Ethics in planning profession, research and education	8	L1, L2
	Total Hours	**39**	

Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1	Village Planning and Rural Development	ITPI	ITPI	-	-
2	Human Settlements	Thooyavan, K.R.	MA Publication, Chennai	--	2005
3	Manual of Integrated District Planning	Planning Commission	Planning Commission	--	2006
4	Normative Ethics in Planning	How, E.	Journal of Planning Literature	Vol.5, No.2, pp. 123-150	2017

Online References:

S. No.	Website Name	URL	Modules Covered
1.	www.nptel.ac.in	https://nptel.ac.in/courses/110104070/9	M1-M6
2.	www.amieindia.in	https://www.amieindia.in/study-materials/product-life-cycle.pdf	M1, M5, M6

B.E. Semester –VII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E. (Information Technology)							**B.E.(SEM :** VII)		
Course Name :Android Apps Development Lab							**Course Code :ITL701**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (25)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**PR**	**TW**	
-	-	2	2	1	--	--	25	25	**50**

IA:In-Semester Exam

ESE : End Semester Exam

Total weightage of marks for continuous evaluation of Term work/Report: Formative (40%), Timely Completion of Practical (40%) and Attendance/Learning Attitude (20%).

Prerequisite: Java Programming, Internet Programming

Lab Objective: The course intends to deliver the fundamental knowledge of Android Studio and Cross Platform, apply and create User Interface, broadcast data, handle Databases using SQLite, understanding security issues on Android Platform.

Lab Outcomes:Upon completion of the course students will be able to:

S. No.	Lab Outcomes	Cognitive levels of attainment as per bloom's Taxonomy
1	Experiment on Integrated Development Environment for Android Application Development.	L1,L2
2	Design and Implement User Interfaces and Layouts of Android App.	L1,L2,L3,L4,L5,L6
3	Use Intents for activity and broadcasting data in Android App.	L1,L2,L3,L4,L5,L6
4	Design and Implement Database Application and Content Providers.	L1,L2,L3,L4,L5,L6
5	Experiment with Camera and Location Based service.	L1,L2,L3,L4,L5,L6
6	Develop Android App with Security features.	L1,L2,L3,L4,L5,L6

Guidelines for Android Apps Development Lab:

1. The mini project work is to be conducted by a group of three students
2. Each group will be associated with a subject In charge/ mini project mentor. The group should meet with the concerned faculty during Laboratory hours and the progress of work discussed must be documented.
3. The students may do survey for different application which they can create Apps using Android.
4. Students will do Installation, configuration of Android Studio & to create AVD and also try for Cross platform Integrated Development Environment (Any Open Source Tool).
5. Students will try to Design and implement following points in their Mini Project (Android Apps)
a. Widget box for Android phone.
b. Use Layouts
c. Use Intents
d. Use Activity
e. Use SQLite
f. Use Camera
g. Use Location API
h. Generate APK file
6. Each group along with the concerned faculty shall identify a potential problem statement for Apps development, on which the study and implementation is to be conducted.
7. Each group may present their work in various project competitions and paper presentations.
8. A detailed report is to be prepared as per guidelines given by the concerned faculty.

Books and References:

S. No.	Title	Authors	Publisher	Edition	Year
1	Professional Android 4 Application Development	RETO MEIER	Wrox publication	3rd	2012
2	Android Security attack and defenses, by CRC Press	Abhishek Dubey, Anmol Misra	CRC Press	1st	2013
3	Beginning Android Application Development	Wei-meng Lee	Wrox publication	1st	2011
4	Android Application Development For Dummies	Michael Burton, DonnFelker	John Wiley & Sons	2nd	2012
5	Android Cookbook	Ian F. Darwin	O'Reilly Media	1st	2011

B.E. Semester –VII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS-H 2019)

B.E (Information Technology)							**B.E(SEM :**VII)		
Course Name :Project-I							**Course Code :ITM702**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Modes of Continuous Assessment / Evaluation**				
Hours Per Week					**Theory (100)**		**Practical/Oral (25)**	**Term Work (50)**	**Total**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**OR**	**TW**	
-	-	6	6	3	-	-	25	50	**75**
IA: In-Semester Assessment **ESE : End Semester Examination** **Total weightage of marks for continuous evaluation of Term work/Report:** Formative (40%), Timely Completion of Practical (40%) and Attendance /Learning Attitude (20%).									
Prerequisite: Knowledge of Software development lifecycle									

Course Objectives: The course intends to deliver the fundamentals of problems and challenges that need IT based solutions. Students will be introduced to the vast array of literature available of the various research challenges in the field of IT. Also To create awareness among the students of the characteristics of several domain areas where IT can be effectively used and To improve the team building, communication and management skills of the students.

Course Outcomes: Upon completion of the course students will be able to:

S. No.	Course Outcomes	Cognitive levels of attainment as per Bloom's Taxonomy
1	Discover potential research areas in the field of IT.	L1, L2, L3,L4
2	Conduct a survey of several available literature in the preferred field of study.	L1, L2, L3
3	Compare and contrast the several existing solutions for research challenge.	L1, L2, L3,L4,L5
4	Demonstrate an ability to work in teams and manage the conduct of the research study.	L1, L2, L3,L4
5	Formulate and propose a plan for creating a solution for the research plan identified.	L1, L2, L3,L4
6	To report and present the findings of the study conducted in the preferred domain.	L1, L2, L3,L4

Guidelines:

1. The project work is to be conducted by a group of three students
2. Each group will be associated with a project mentor/guide. The group should meet with the project mentor/guide periodically and record of the meetings and work discussed must be documented.
3. Department has to allocate 1 day in VII semester and 2 day in VIII semester every week.
4. Students will do literature survey in Sem VI or Sem VII.
5. Students will do design, implementation and coding in Sem VII.
6. Each group along with its guide/mentor shall identify a potential research area/problem domain, on which the study is to be conducted.
7. Each team will do a rigorous literature survey of the problem domain by reading and understanding at least 3-5 research papers from current good quality national/international journals/conferences. (Papers selected must be indexed by Scopus/IEEE/Springer/ACM etc.). The list of papers surveyed must be clearly documented.
8. The project assessment for term work will be done at least two times at department level by giving presentation to panel members which consist of at least three (3) members as Internal examiners (including the project guide/mentor) appointed by the Head of the department of respective Programme.
9. A report is to be prepared summarizing the findings of the literature survey. A comparative evaluation of the different techniques surveyed is also to be done.
10. Students will do testing and analyze in Sem VIII
11. Teams must analyze all the results obtained by comparing with other standard techniques.
12. Every team must publish their work in national / international conference/journals (if possible publish in Scopus indexed journals).

B.E. Semester –VII

Choice Based Credit Grading Scheme with Holistic Student Development (CBCGS- H 2019)

BE (Information Technology)							**SEM: VII**		
Course Name: Research Based Learning 3							**Course Code: ITRBL701**		
Teaching Scheme (Program Specific)					**Examination Scheme (Formative/ Summative)**				
Modes of Teaching / Learning / Weightage					**Assessment/Evaluation Scheme**				
Hours Per Week					**Presentation**		**Report**		**Term Work**
Theory	**Tutorial**	**Practical**	**Contact Hours**	**Credits**	**IA**	**ESE**	**IA**	**ESE**	**TW**
Audit course evaluated by Teacher Guardian									
Mid Semester Assessment for Term work will be on continuous basis									
Prerequisite: Subject knowledge, Domain knowledge									

Course Objectives:
This course is focused to give basic aspects of Research and development, including research methodologies, innovation, IPR, and entrepreneurship.

Course Outcomes:Upon completion of the course students will be able to:

S.N.	Course Outcome	Cognitive level attainment as per revised Bloom Taxonomy
1	Students will be to publish research paper.	L1, L2, L3,L4
2	Student will be able to create new idea for problem solving related to industry or societal issues.	L1, L2, L3,L4
3	Students will be to developentrepreneurial thinking with an idea to convert project into product.	L1, L2, L3,L4,l5,L6
4	Students will be aware ofethics and plagiarism aspects in technical writing.	L1, L2, L3,L4,l5,L6

Detailed Syllabus:

Module No.	Topics	Cognitive level attainment as per revised Bloom Taxonomy
1	**Research Publication** Forming interest groups with mentors, Topic Identification, Literature Survey, and Sketching of Idea/Design of Survey, Implementation, and Analysis of Results, Identifying journal /conference for publication conference paper, Publishing of research Paper/Survey paper. **Evaluation by faculty as per format**.	L1, L2, L3,L4
2	**Management of Innovation and Technical Change** What is innovation, kinds of Innovation, Innovation as a core business process, Developing an innovation strategy, Sources of innovation, Creating new products and services **Idea competition and evaluation.**	L1, L2, L3,L4
3	**Research Ethics, IPR And Scholarly Publishing** Ethical issues; IPR-intellectual property rights and patent law, commercialization, copy right, royalty, trade related aspects of intellectual property rights (TRIPS); scholarly publishing-IMRAD concept and design of research paper, citation and acknowledgement, plagiarism, reproducibility and accountability.	L1, L2, L3,L4,l5,L6

	Evaluation of product feasibility for IPR.	
4	**Entrepreneurship** Concepts and practices of technology entrepreneurial thinking and entrepreneurship. Using lectures, case studies, business plans, and student presentations, the course teaches life skills in entrepreneurial thought and action that students can utilize in starting technology companies or executing R&D projects in large companies. **Pitch presentation competition and evaluation**	L1, L2, L3,L4,l5,L6

References:

Sr. No.	Title	Authors	Publisher	Edition	Year
5.	Research Methodology Methods and Techniques	C.R. Kothari	New Age International Limited,	2nd Edition	2004
6.	Entrepreneurship Development and Small Business Enterprise	Poornima M. Charantimath	Pearson Education India	5thEdition	2005
3.	Law Relating to Patents, Trade Marks, Copyright, Designs and Geographical Indications	B. L. Wadehra	Universal Law Publishing Co Ltd	Kindle	2004

Online References:

Sr. No.	Website Name	URL	Modules Covered
1.	https://www.statpac.com	https://www.statpac.com/online-software-manual/Basic-Research-Concepts.htm	M1
2.	https://www.slideshare.net	https://www.slideshare.net/25Mksp/management-technology-innovation-change	M2
3.	https://www.eng.ufl.edu	https://www.eng.ufl.edu/leadership/wp-content/uploads/sites/7/2015/02/Engineering-Entrepreneurship-Course-Overview.pdf	M4
4.	https://www.vesalius.edu	https://www.vesalius.edu/wp-content/uploads/2016/11/BUS213G-S15.pdf	M3