

SEMESTER- VI

Sl. No.	Subject Codes	Subject	Periods			Evaluation Scheme			End Semester		Total	Credit	
			L	T	P	CT	TA	Total	PS	TE			
1	KCS601	Software Engineering	3	1	0	30	20	50		100		150	4
2	KCS602	Web Technology	3	1	0	30	20	50		100		150	4
3	KCS603	Computer Networks	3	1	0	30	20	50		100		150	4
4	Dept. Elective-III	Departmental Elective-III	3	0	0	30	20	50		100		150	3
5		Open Elective-I [Annexure - B(iv)]	3	0	0	30	20	50		100		150	3
6	KCS651	Software Engineering Lab	0	0	2				25		25	50	1
7	KCS652	Web Technology Lab	0	0	2				25		25	50	1
8	KCS653	Computer Networks Lab	0	0	2				25		25	50	1
9	KNC601/ KNC602	Constitution of India, Law and Engineering / Indian Tradition, Culture and Society	2	0	0	15	10	25		50			
10		MOOCs (Essential for Hons. Degree)											
		Total	0	3	6						900	21	

Departmental Elective-I

1. KCS-051 Data Analytics
2. KCS-052 Web Designing
3. KCS-053 Computer Graphics
4. KCS-054 Object Oriented System Design

Departmental Elective-II

1. KCS-055 Machine Learning Techniques
2. KCS-056 Application of Soft Computing
3. KCS-057 Augmented & Virtual Reality
4. KCS-058 Human Computer Interface

Departmental Elective-III

1. KCS-061 Big Data
2. KCS-062 Image Processing
3. KCS-063 Real Time Systems
4. KCS-064 Data Compression

B.TECH. (CSE & CS)
SIXTH SEMESTER (DETAILED SYLLABUS)

Software Engineering (KCS-601)		
Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course, the student will be able to		
CO 1	Explain various software characteristics and analyze different software Development Models.	K ₁ , K ₂
CO 2	Demonstrate the contents of a SRS and apply basic software quality assurance practices to ensure that design, development meet or exceed applicable standards.	K ₁ , K ₂
CO 3	Compare and contrast various methods for software design	K ₂ , K ₃
CO 4	Formulate testing strategy for software systems, employ techniques such as unit testing, Test driven development and functional testing.	K ₃
CO 5	Manage software development process independently as well as in teams and make use of Various software management tools for development, maintenance and analysis.	K ₅
DETAILED SYLLABUS		3-1-0
Unit	Topic	Proposed Lecture
I	Introduction: Introduction to Software Engineering, Software Components, Software Characteristics, Software Crisis, Software Engineering Processes, Similarity and Differences from Conventional Engineering Processes, Software Quality Attributes. Software Development Life Cycle (SDLC) Models: Water Fall Model, Prototype Model, Spiral Model, Evolutionary Development Models, Iterative Enhancement Models.	08
II	Software Requirement Specifications (SRS): Requirement Engineering Process: Elicitation, Analysis, Documentation, Review and Management of User Needs, Feasibility Study, Information Modelling, Data Flow Diagrams, Entity Relationship Diagrams, Decision Tables, SRS Document, IEEE Standards for SRS. Software Quality Assurance (SQA): Verification and Validation, SQA Plans, Software Quality Frameworks, ISO 9000 Models, SEI-CMM Model.	08
III	Software Design: Basic Concept of Software Design, Architectural Design, Low Level Design: Modularization, Design Structure Charts, Pseudo Codes, Flow Charts, Coupling and Cohesion Measures, Design Strategies: Function Oriented Design, Object Oriented Design, Top-Down and Bottom-Up Design. Software Measurement and Metrics: Various Size Oriented Measures: Halstead's Software Science, Function Point (FP) Based Measures, Cyclomatic Complexity Measures: Control Flow Graphs.	08
IV	Software Testing: Testing Objectives, Unit Testing, Integration Testing, Acceptance Testing, Regression Testing, Testing for Functionality and Testing for Performance, TopDown and Bottom-Up Testing Strategies: Test Drivers and Test Stubs, Structural Testing (White Box Testing), Functional Testing (Black Box Testing), Test Data Suit Preparation, Alpha and Beta Testing of Products. Static Testing Strategies: Formal Technical Reviews (Peer Reviews), Walk Through, Code Inspection, Compliance with Design and Coding Standards.	08
V	Software Maintenance and Software Project Management: Software as an Evolutionary Entity, Need for Maintenance, Categories of Maintenance: Preventive, Corrective and Perfective Maintenance, Cost of Maintenance, Software Re- Engineering, Reverse Engineering. Software Configuration Management Activities, Change Control Process, Software Version Control, An Overview of CASE Tools. Estimation of Various Parameters such as Cost, Efforts,	08

	Schedule/Duration, Constructive Cost Models (COCOMO), Resource Allocation Models, Software Risk Analysis and Management.	
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Text books:

- 1.RS Pressman, Software Engineering: A Practitioners Approach, McGraw Hill.
2. Pankaj Jalote, Software Engineering, Wiley
3. Rajib Mall, Fundamentals of Software Engineering, PHI Publication.
4. KK Aggarwal and Yogesh Singh, Software Engineering, New Age International Publishers.
5. Ghezzi, M. Jarayeri, D. Manodrioli, Fundamentals of Software Engineering, PHI Publication.
6. Ian Sommerville, Software Engineering, Addison Wesley.
7. Kassem Saleh, “Software Engineering”, Cengage Learning.
8. P fleeger, Software Engineering, Macmillan Publication

Web Technology (KCS-602)		
Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to		
CO 1	Explain web development Strategies and Protocols governing Web.	K ₁ , K ₂
CO 2	Develop Java programs for window/web-based applications.	K ₂ , K ₃
CO 3	Design web pages using HTML, XML, CSS and JavaScript.	K ₂ , K ₃
CO 4	Creation of client-server environment using socket programming	K ₁ , K ₂ ,
CO 5	Building enterprise level applications and manipulate web databases using JDBC	K ₃ , K ₄
CO6	Design interactive web applications using Servlets and JSP	K ₂ , K ₃
DETAILED SYLLABUS		3-0-0
Unit	Topic	Proposed Lecture
I	Introduction: Introduction and Web Development Strategies, History of Web and Internet, Protocols Governing Web, Writing Web Projects, Connecting to Internet, Introduction to Internet services and tools, Introduction to client-server computing. Core Java: Introduction, Operator, Data type, Variable, Arrays, Methods & Classes, Inheritance, Package and Interface, Exception Handling, Multithread programming, I/O, Java Applet, String handling, Event handling, Introduction to AWT, AWT controls, Layout managers	08
II	Web Page Designing: HTML: List, Table, Images, Frames, forms, CSS, Document type definition, XML: DTD, XML schemes, Object Models, presenting and using XML, Using XML Processors: DOM and SAX, Dynamic HTML	08
III	Scripting: Java script: Introduction, documents, forms, statements, functions, objects; introduction to AJAX, Networking : Internet Addressing, InetAddress, Factory Methods, Instance Methods, TCP/IP Client Sockets, URL, URL Connection, TCP/IP Server Sockets, Datagram.	08
IV	Enterprise Java Bean: Preparing a Class to be a JavaBeans, Creating a JavaBeans, JavaBeans Properties, Types of beans, Stateful Session bean, Stateless Session bean, Entity bean Java Database Connectivity (JDBC): Merging Data from Multiple Tables: Joining, Manipulating, Databases with JDBC, Prepared Statements, Transaction Processing, Stored Procedures.	08
V	Servlets: Servlet Overview and Architecture, Interface Servlet and the Servlet Life Cycle, Handling HTTP get Requests, Handling HTTP post Requests, Redirecting Requests to Other Resources, Session Tracking, Cookies, Session Tracking with Http Session Java Server Pages (JSP): Introduction, Java Server Pages Overview, A First Java Server Page Example, Implicit Objects, Scripting, Standard Actions, Directives, Custom Tag Libraries..	08
Text books:		
1. Burdman, Jessica, "Collaborative Web Development" Addison Wesley 2. Xavier, C, " Web Technology and Design" , New Age International 3. Ivan Bayross," HTML, DHTML, Java Script, Perl & CGI", BPB Publication 4. Bhave, "Programming with Java", Pearson Education 5. Herbert Schildt, "The Complete Reference:Java", McGraw Hill. 6. Hans Bergsten, "Java Server Pages", SPD O'Reilly 7. Margaret Levine Young, "The Complete Reference Internet", McGraw Hill. 8. Naughton, Schildt, "The Complete Reference JAVA2", McGraw Hill. 9. Balagurusamy E, "Programming in JAVA", McGraw Hill.		

Computer Networks(KCS- 603)		
Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to		
CO1	Explain basic concepts, OSI reference model, services and role of each layer of OSI model and TCP/IP, networks devices and transmission media, Analog and digital data transmission	K ₁ ,K ₂
CO2	Apply channel allocation, framing, error and flow control techniques.	K ₃
CO3	Describe the functions of Network Layer i.e. Logical addressing, subnetting & Routing Mechanism.	K ₂ ,K ₃
CO4	Explain the different Transport Layer function i.e. Port addressing, Connection Management, Error control and Flow control mechanism.	K ₂ ,K ₃
CO5	Explain the functions offered by session and presentation layer and their Implementation.	K ₂ ,K ₃
CO6	Explain the different protocols used at application layer i.e. HTTP, SNMP, SMTP, FTP, TELNET and VPN.	K ₂
DETAILED SYLLABUS		3-0-0
Unit	Topic	Proposed Lecture
I	Introductory Concepts: Goals and applications of networks, Categories of networks, Organization of the Internet, ISP, Network structure and architecture (layering principles, services, protocols and standards), The OSI reference model, TCP/IP protocol suite, Network devices and components. Physical Layer: Network topology design, Types of connections, Transmission media, Signal transmission and encoding, Network performance and transmission impairments, Switching techniques and multiplexing.	08
II	Link layer: Framing, Error Detection and Correction, Flow control (Elementary Data Link Protocols, Sliding Window protocols). Medium Access Control and Local Area Networks: Channel allocation, Multiple access protocols, LAN standards, Link layer switches & bridges (learning bridge and spanning tree algorithms).	08
III	Network Layer: Point-to-point networks, Logical addressing, Basic internetworking (IP, CIDR, ARP, RARP, DHCP, ICMP), Routing, forwarding and delivery, Static and dynamic routing, Routing algorithms and protocols, Congestion control algorithms, IPv6.	08
IV	Transport Layer: Process-to-process delivery, Transport layer protocols (UDP and TCP), Multiplexing, Connection management, Flow control and retransmission, Window management, TCP Congestion control, Quality of service.	08
V	Application Layer: Domain Name System, World Wide Web and Hyper Text Transfer Protocol, Electronic mail, File Transfer Protocol, Remote login, Network management, Data compression, Cryptography – basic concepts.	08
Text books and References:		
1. Behrouz Forouzan, "Data Communication and Networking", McGraw Hill 2. Andrew Tanenbaum "Computer Networks", Prentice Hall. 3. William Stallings, "Data and Computer Communication", Pearson. 4. Kurose and Ross, "Computer Networking- A Top-Down Approach", Pearson. 5. Peterson and Davie, "Computer Networks: A Systems Approach", Morgan Kaufmann 6. W. A. Shay, "Understanding Communications and Networks", Cengage Learning. 7. D. Comer, "Computer Networks and Internets", Pearson. 8. Behrouz Forouzan, "TCP/IP Protocol Suite", McGraw Hill.		

Big Data(KCS-061)

Course Outcome (CO)		Bloom's Knowledge Level (KL)
At the end of course , the student will be able to		
CO 1	Demonstrate knowledge of Big Data Analytics concepts and its applications in business.	K ₁ ,K ₂
CO 2	Demonstrate functions and components of Map Reduce Framework and HDFS.	K ₁ ,K ₂
CO 3	Discuss Data Management concepts in NoSQL environment.	K ₆
CO 4	Explain process of developing Map Reduce based distributed processing applications.	K ₂ ,K ₅
CO 5	Explain process of developing applications using HBASE, Hive, Pig etc.	K ₂ ,K ₅
DETAILED SYLLABUS		3-0-0
Unit	Topic	Proposed Lectures
I	Introduction to Big Data: Types of digital data, history of Big Data innovation, introduction to Big Data platform, drivers for Big Data, Big Data architecture and characteristics, 5 Vs of Big Data, Big Data technology components, Big Data importance and applications, Big Data features – security, compliance, auditing and protection, Big Data privacy and ethics, Big Data Analytics, Challenges of conventional systems, intelligent data analysis, nature of data, analytic processes and tools, analysis vs reporting, modern data analytic tools.	06
II	Hadoop: History of Hadoop, Apache Hadoop, the Hadoop Distributed File System, components of Hadoop, data format, analyzing data with Hadoop, scaling out, Hadoop streaming, Hadoop pipes, Hadoop Echo System. Map Reduce: Map Reduce framework and basics, how Map Reduce works, developing a Map Reduce application, unit tests with MR unit, test data and local tests, anatomy of a Map Reduce job run, failures, job scheduling, shuffle and sort, task execution, Map Reduce types, input formats, output formats, Map Reduce features, Real-world Map Reduce	08
III	HDFS (Hadoop Distributed File System): Design of HDFS, HDFS concepts, benefits and challenges, file sizes, block sizes and block abstraction in HDFS, data replication, how does HDFS store, read, and write files, Java interfaces to HDFS, command line interface, Hadoop file system interfaces, data flow, data ingest with Flume and Scoop, Hadoop archives, Hadoop I/O: compression, serialization, Avro and file-based data structures. Hadoop Environment: Setting up a Hadoop cluster, cluster specification, cluster setup and installation, Hadoop configuration, security in Hadoop, administering Hadoop, HDFS monitoring & maintenance, Hadoop benchmarks, Hadoop in the cloud	08
IV	Hadoop Eco System and YARN: Hadoop ecosystem components, schedulers, fair and capacity, Hadoop 2.0 New Features - NameNode high availability, HDFS federation, MRv2, YARN, Running MRv1 in YARN. NoSQL Databases: Introduction to NoSQL MongoDB: Introduction, data types, creating, updating and deleting documents, querying, introduction to indexing, capped collections Spark: Installing spark, spark applications, jobs, stages and tasks, Resilient Distributed Databases, anatomy of a Spark job run, Spark on YARN SCALA: Introduction, classes and objects, basic types and operators, built-in control structures, functions and closures, inheritance.	09
V	Hadoop Eco System Frameworks: Applications on Big Data using Pig, Hive and HBase Pig - Introduction to PIG, Execution Modes of Pig, Comparison of Pig with Databases, Grunt, Pig Latin, User Defined Functions, Data Processing operators,	09

	<p>Hive - Apache Hive architecture and installation, Hive shell, Hive services, Hive metastore, comparison with traditional databases, HiveQL, tables, querying data and user defined functions, sorting and aggregating, Map Reduce scripts, joins & subqueries.</p> <p>HBase – Hbase concepts, clients, example, Hbase vs RDBMS, advanced usage, schema design, advance indexing, Zookeeper – how it helps in monitoring a cluster, how to build applications with Zookeeper.</p> <p>IBM Big Data strategy, introduction to Infosphere, BigInsights and Big Sheets, introduction to Big SQL.</p>	
Text books and References:		
<ol style="list-style-type: none"> 1. Michael Minelli, Michelle Chambers, and Ambiga Dhiraj, "Big Data, Big Analytics: Emerging Business Intelligence and Analytic Trends for Today's Businesses", Wiley 2. Big-Data Black Book, DT Editorial Services, Wiley 3. Dirk deRoos, Chris Eaton, George Lapis, Paul Zikopoulos, Tom Deutsch, "Understanding Big Data Analytics for Enterprise Class Hadoop and Streaming Data", McGrawHill. 4. Thomas Erl, Wajid Khattak, Paul Buhler, "Big Data Fundamentals: Concepts, Drivers and Techniques", Prentice Hall. 5. Bart Baesens "Analytics in a Big Data World: The Essential Guide to Data Science and its Applications (WILEY Big Data Series)", John Wiley & Sons 6. Arshdeep Bahga, Vijay Madisetti, "Big Data Science & Analytics: A HandsOn Approach ", VPT 7. Anand Rajaraman and Jeffrey David Ullman, "Mining of Massive Datasets", CUP 8. Tom White, "Hadoop: The Definitive Guide", O'Reilly. 9. Eric Sammer, "Hadoop Operations", O'Reilly. 10. Chuck Lam, "Hadoop in Action", MANNING Publishers 11. Deepak Vohra, "Practical Hadoop Ecosystem: A Definitive Guide to Hadoop-Related Frameworks and Tools", Apress 12. E. Capriolo, D. Wampler, and J. Rutherglen, "Programming Hive", O'Reilly 13. Lars George, "HBase: The Definitive Guide", O'Reilly. 14. Alan Gates, "Programming Pig", O'Reilly. 15. Michael Berthold, David J. Hand, "Intelligent Data Analysis", Springer 16. Bill Franks, "Taming the Big Data Tidal Wave: Finding Opportunities in Huge Data Streams with Advanced Analytics", John Wiley & sons 17. Glenn J. Myatt, "Making Sense of Data", John Wiley & Sons 18. Pete Warden, "Big Data Glossary", O'Reilly 		