

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Third Semester Computer Science and Engineering**

Examination Scheme																		
Course Category	Course Code	Bos	Course Title	Teaching Scheme			THEORY						PRACTICAL					
				Hours per week			Number of Credits	Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks	
				L	T	P				Sessional	IE							
BSC/ESC /HSMC	SE101CS	S&H	Applied Mathematics-III (Differential Calculus)	3	0	0	2	3	80	10	10	100	40	-	-	-	-	
PCC	SE102CS	Computer	Data structure & Algorithms	3	0	0	3	3	80	10	10	100	40	-	-	-	-	
PCC	SE103CS	Computer	Computer Organization & Architecture	3	0	0	3	3	80	10	10	100	40	-	-	-	-	
ESC	SE104CS	Electronics	Digital Electronics	3	0	0	3	3	80	10	10	100	40	-	-	-	-	
HSMC	SE105CS	HSMC	Effective Technical Communication in English	3	0	0	3	3	80	10	10	100	40	-	-	-	-	
PCC	SE106CS	Computer	Data structure & Algorithms	0	0	2	2	-	-	-	-	-	-	25	25	50	25	
PCC	SE107CS	Electronics	Digital Electronics	0	0	2	2	-	-	-	-	-	-	25	25	50	25	
PCC	SE108CS	Computer	Computer Workshop	0	0	2	2	-	-	-	-	-	-	25	25	50	25	
MC	SE109CS	S&H	Environmental Sciences	2	0	0	0	-	-	-	-	-	-	-	-	-	-	
				17	0	06	20	-				500				150		
				23			20					650						

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**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Fourth Semester Computer Science and Engineering**

Examination Scheme																				
Course Category	Course Code	BoS	Course Title	Teaching Scheme			THEORY											PRACTICAL		
				Hours per week			Number of Credits	Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks	Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks				
				L	T	P														
																	Max. Marks Sessional			
																		MSE	IE	
PCC	SE201CS	S&H	Discrete Mathematics	3	1	0	4	3	80	10	10	10	40	-	-	-	-			
PCC	SE202CS	Computer	Design & Analysis of Algorithms	3	0	0	3	3	80	10	10	10	40	-	-	-	-			
PCC	SE203CS	Computer	Operating Systems	3	0	0	3	3	80	10	10	10	40	-	-	-	-			
ESC	SE204CS	Computer	Object Oriented Programming	3	0	0	3	3	80	10	10	10	40	-	-	-	-			
HSMC	SE205CS	S&H	Finance & Accounting	3	0	0	3	3	80	10	10	10	40	-	-	-	-			
PCC	SE206CS	Computer	Design & Analysis of Algorithms	0	0	2	2	-	-	-	-	-	-	25	25	50	25			
PCC	SE207CS	Computer	Operating Systems	0	0	2	1	-	-	-	-	-	-	25	25	50	25			
PCC	SE208CS	Computer	Object Oriented Programming	0	0	2	1	-	-	-	-	-	-	25	25	50	25			
				15	1	06	20	-												
				22			20							500		150				
																	650			

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Fifth Semester Computer Science and Engineering**

Course Category	Course Code	BoS	Course Title	Teaching Scheme			Examination Scheme										
				Hours per week			Number of Credits	THEORY						PRACTICAL			
				L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
										MSE	IE						
ESC	TE101CS	Electronics	Signals & System	3	0	0	3	80	10	10	100	40	-	-	-	-	
PCC	TE102CS	Computer	Database Management System	3	1	0	4	80	10	10	100	40	-	-	-	-	
PCC	TE103CS	Computer	Formal Language & Automata Theory	3	0	0	3	80	10	10	100	40	-	-	-	-	
HSMC	TE104CS	Computer	Java Programming	3	0	0	3	80	10	10	100	40	-	-	-	-	
	TE105CS	HSMC	Principles of Management Information System	3	0	0	3	80	10	10	100	40	-	-	-	-	
PEC	TE106CS	Computer	Ele-I 1.Graph Theory 2.Software Engg. 3.Artificial Intelligence 4.Image Processing	3	0	0	3	80	10	10	100	40	-	-	-	-	
Mandatory course	TE107CS	MC	Constitution of India	2	0	0	0	-	-	-	-	-	-	-	-	-	
PCC	TE108CS	Computer	Database Management System	0	0	2	1	-	-	-	-	-	25	25	50	25	
PCC	TE109CS	Computer	Formal Language & Automata Theory	0	0	2	1	-	-	-	-	-	25	25	50	25	
PCC	TE110CS	Computer	Java Programming	0	0	2	1	-	-	-	-	-	25	25	50	25	
				20	1	06	22	-									
				27			22					600				150	
																750	

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Sixth Semester Computer Science and Engineering**

Course Category	Course Code	BoS	Course Title	Teaching Scheme			Examination Scheme											
				Hours per week			Number of Credits	THEORY						PRACTICAL				
				L	T	P		Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional			Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks
										MSE	IE							
PCC	TE201CS	Computer	Compiler Design	3	1	0	4	3	80	10	10	10	40	-	-	-	-	
PCC	TE202CS	Computer	Computer Networks	3	1	0	4	3	80	10	10	10	40	-	-	-	-	
PEC	TE203CS	Computer	PEle-II 1.Data Mining 2.Distributed System 3.Machine Learning 4.Human Computer Interaction	3	0	0	3	3	80	10	10	10	40	-	-	-	-	
PEC	TE204CS	Computer	PEle-III 1.Computational Geometry 2.Real Time Systems 3.Neural Network and Deep Learning 4.Optimization Techniques	3	0	0	3	3	80	10	10	10	40	-	-	-	-	
OEC	TE205CS	Humanities	Open Ele.-I 1. Soft Skills and Interpersonal Communication 2.Human Resource Development and Organizational Behavior	3	0	0	3	3	80	10	10	10	40	-	-	-	-	
PCC	TE206CS	Computer	Compiler Design	0	0	2	1	-	-	-	-	-	-	25	25	50	25	
PCC	TE207CS	Computer	Computer Networks	0	0	2	1	-	-	-	-	-	-	25	25	50	25	
PROJ	TE208CS	Computer	Mini Project	0	0	6	3	-	-	-	-	-	-	50	50	100	50	
Ind Training	TE209CS	Computer	Industrial Training /Internship/Case Studies (2 to 4 Weeks)##	-	-	-	2	-	-	-	-	-	-	25	25	50	25	
				15	2	10	24	-										
				27			24	-								500	250	
																		750

**## Industrial Training /Internship/Case Studies:-**It is to be completed during the summer vacation after completion of fourth semester and/or winter vacation after the completion of Fifth semester and its planning and allocation should be done during the fourth/ fifth semester and its marks will be awarded in the sixth semester for subject code TE209CS on submission of the certified relevant report at the end of sixth semester

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Seventh Semester Computer Science and Engineering**

Examination Scheme																			
Course Category	Course Code	BoS	Course Title	Teaching Scheme			THEORY							PRACTICAL					
				Hours per week			Number of Credits	Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks		
				L	T	P				MSE	IE								
PCC	BE101CS	Computer	TCP/IP and Internet	3	0	0	3	3	80	10	10	100	40	-	-	-	-		
PCC	BE102CS	Computer	Software Testing & Quality Assurance	3	0	0	3	3	80	10	10	100	40	-	-	-	-		
PEC	BE103CS	Computer	PE-IV 1. Cloud Computing 2. Internet of Things 3. Data Analytics 4. Web and Internet Technology	3	0	0	3	3	80	10	10	100	40	-	-	-	-		
OEC	BE104CS	Computer	OE-II 1. Cyber Law and Ethics 2. Indian Music System	3	0	0	3	3	80	10	10	100	40	-	-	-	-		
PEC	BE105CS	Computer	TCP/IP and Internet	0	0	2	1	-	-	-	-	-	-	25	25	50	25		
PEC	BE106CS	Computer	Software Testing & Quality Assurance	0	0	2	1	-	-	-	-	-	-	25	25	50	25		
PROJ	BE107CS	Computer	Project-I	0	0	6	6	-	-	-	-	-	-	75	75	150	75		
				12	0	10	20	-											
				22		20						400				250			
																	650		

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**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Eighth Semester Computer Science and Engineering**

Examination Scheme																		
Course Category	Course Code	BoS	Course Title	Teaching Scheme			THEORY							PRACTICAL				
				Hours per week			Number of Credits	Duration of Paper (Hrs.)	Max. Marks ESE	Max. Marks Sessional		Total	Min. Passing Marks	Max. Marks TW	Max. Marks POE	Total	Min. Passing Marks	
				L	T	P				MSE	IE							
PCC	BE201CS	Computer	Computer Security	3	0	0	3	3	80	10	10	100	40	-	-	-	-	
PEC	BE202CS	Computer	PE-V 1. Soft Computing 2. Advanced Computer Architecture 3. Enterprise Resource Planning 4. Parallel Computing	3	0	0	3	3	80	10	10	100	40	-	-	-	-	
OEC	BE203CS	Computer	OE-III 1. History of Science & Technology 2. Economic Policies in India	3	0	0	3	3	80	10	10	100	40	-	-	-	-	
PEC	BE204CS	Computer	Computer System Security	0	0	2	1	-	-	-	-	-	-	25	25	50	25	
PROJ	BE206CS	Computer	Project-II	0	0	6	6	-	-	-	-	-	-	75	75	150	75	
				9	0	8	16	-										
				17			16						300			200		
																	500	

28

**A. Definition of Credit:**

- 1 Hr. Lecture (L) per week 1 credit
- 1 Hr. Tutorial (T) per week 1 credit
- 2 Hours Practical(Lab)/week 1 or 2 credit

**B. Range of credits – A credits of 160 is required for a student to be eligible to get Under Graduate degree in Engineering.**

**C. Structure of Undergraduate Engineering program :**

S.No	Abbreviations	Category	Suggested Breakup of Credits(Total 160)
1	HSMC	Humanities and Social Sciences including Management courses	12*
2	BSC	Basic Science courses	25*
3	ESC	Engineering Science courses including workshop, drawing, basics of electrical/mechanical/computer etc	24*
4	PCC	Professional core courses	48*
5	PEC	Professional Elective courses relevant to chosen specialization/branch	18*
6	OEC	Open subjects – Electives from other technical and /or emerging subjects	18*
7	PROJ	Project work, seminar and internship in industry or elsewhere	15*
8	MC	Mandatory Courses [Environmental Sciences, Induction Program, Indian Constitution, Essence of Indian Knowledge Tradition]	(non-credit)
<b>Total</b>			<b>160*</b>

\*Minor variation is allowed as per need of the respective disciplines.

Abbreviations			Mandatory courses	
L	Lecture	MC	Project	
T	Tutorial	PROJ	Mid Semester Examination	
P	Practical	MSE	Internal Evaluation	
BSC	Basic Science Courses	IE	End Semester Examination	
ESC	Engineering Science Course	ESE	Term work	
HSMC	Humanities and Social Sciences including Management courses	TW	Performance & Oral Examination	
PCC	Professional core courses	POE	Board of Studies (Board)	
PEC	Professional Elective courses	BoS		
OEC	Open Elective courses			

### CREDITS DISTRIBUTION

Sr.No.	Semester	Total Credits
1	First	19
2	Second	19
3	Third	20
4	Fourth	20
5	Fifth	22
6	Sixth	24
7	Seventh	20
8	Eighth	16
Total Credits		160

28

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Seventh Semester Computer Science and Engineering**

**Course Code:** BE101CS  
**Title of the Course:** TCP/IP and Internet

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Units	Contents	Hours
1	<b>INTRODUCTION AND ADDRESSES:</b> Introduction, The TCP/IP Architecture, protocol & layering, The Internet Protocol: IP Packet, IP Addressing, Subnet Addressing, IP Routing, Classless Inter-Domain Routing (CIDR), Address Resolution(ARP), Reverse Address Resolution(RARP), Internet Message Control Protocols(ICMP) Error and Control Messages, Dynamic	9
2	<b>NETWORK LAYER PROTOCOLS:</b> Router functionality, Dynamic versus Static routing, Routing tables, Unicast routing: Routing Information Protocol (RIP), Border Gateway Protocol (BGP), Open Shortest Path First (OSPF), Routing algorithms (link state, distance vector), Multicast Routing: Routing protocols (MOSPF, DVMRP, CBT, and PIM), MBONE, IGMP, End-to-end datagram delivery, and Flow control.	9
3	<b>TRANSPORT LAYER PROTOCOLS &amp; NEXT GENERATION IP:</b> Transmission Control Protocol (TCP): TCP Reliable Stream Service, TCP Operation, TCP Protocol, User Datagram Protocol (UDP), Stream Control Transmission Protocol (SCTP), IPv6, ICMPv6, Transitioning from IPv4 to IPv6.	9
4	<b>APPLICATION LAYER PROTOCOLS:</b> Client-Server Interaction: The Client-Server Paradigm, The Socket Interface. Naming With The Domain Name System, Electronic Mail Representation And Transfer, File Transfer And Remote File Access, World Wide Web Pages And Browsing.	9
5	<b>MULTIMEDIA INFORMATION &amp; NETWORKING:</b> Introduction to Digital Audio, Audio compression, Streaming Audio, Internet Radio, Voice over IP, Introduction to video, Video compression, Video on demand The Real time transport Protocol: RTP Scenarios and terminology, RTP Packet format, RTP Control Protocol(RTCP) Session control Protocols: Session initiation Protocol, H.323 Multimedia communication systems, Media Gateway Control Protocols.	9
<b>Total</b>		<b>45</b>

**Text Books:**

1. TCP/IP Protocol Suite, 4th Edition, by Behrouz A Forouzan (Tata Mcgraw Hill 2010).

**Reference books:**

1. Internetworking with TCP/IP, Volume 1: Principles, Protocols, and Architecture, by Douglas Comer, 5th edition, Prentice Hall.
2. Computer Networking with Internet Protocols and Technology, 1/e -- © 2003 William Stallings
3. Communication networks, Leon-Gracia& Widjaja,2001, TMH
4. TCP/IP Illustrated, Volume 1 : The Protocols, 1/e -- © 2000, W. Richard Stevens, Person education
5. TCP/IP Illustrated, Volume 2 : The Implementation, 1/e -- © 1996, Gary R. Wright
6. An Engineering approach to computer networking, S. Keshav, Addison Wesley, 2001

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7

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Seventh Semester Computer Science and Engineering**

**Course Code:** BE102CS

**Title of the Course:** Software Testing & Quality Assurance

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
1	Testing as an Engineering Activity – Role of Process in Software Quality – Testing as a Process – Basic Definitions – Software Testing Principles – The Tester’s Role in a Software Development Organization – Origins of Defects – Defect Classes – The Defect Repository and Test Design – Defect Examples – Developer/Tester Support for Developing a Defect Repository.	09
2	Introduction to Testing Design Strategies – The Smarter Tester – Test Case Design Strategies – Using Black Box Approach to Test Case Design Random Testing Requirements based testing – positive and negative testing –Boundary Value Analysis – decision tables - Equivalence Class Partitioning state-based testing– cause effect graphing – error guessing - compatibility testing – user documentation testing –domain testing Using White-Box Approach to Test design – Test Adequacy Criteria –static testing vs. structural testing – code functional testing - Coverage and Control Flow Graphs – Covering Code Logic – Paths – Their Role in White-box Based Test Design –code complexity testing – Evaluating Test Adequacy Criteria.	09
3	The Need for Levels of Testing, Unit Test, Unit Test Planning, Designing the Unit Tests. The Test Harness, Running the Unit tests and Recording results, Integration tests, Designing Integration Tests, Integration Test Planning, Scenario testing –defect bash elimination, System Testing – types of system testing, Acceptance testing – performance testing , Regression Testing, Internationalization testing, ad-hoc testing, Alpha Test , Beta Tests, Testing OO systems – usability and accessibility testing.	09
4	People and organizational issues in testing – organization structures for testing teams –testing services - Test Planning – Test Plan Components – Test Plan Attachments – Locating Test Items – test management – test process - Reporting Test Results – The role of three groups in Test Planning and Policy Development – Introducing the test specialist – Skills needed by a test specialist – Building a Testing Group	09
5	Software test automation – skills needed for automation – scope of automation – design and architecture for automation – requirements for a test tool – challenges in automation Test metrics and measurements –project, progress and productivity metrics – Status Meetings – Reports and Control Issues – Criteria for Test Completion – SCM – Types of reviews – Developing a review program – Components of Review Plans– Reporting Review Results. – evaluating software quality – defect prevention – testing maturity model	09
<b>Total</b>		<b>45</b>

**Text Books:**

1. Srinivasan Desikan and Gopalaswamy Ramesh, “ Software Testing – Principles and Practices ”, Pearson education, 2006.
2. Aditya P.Mathur, “Foundations of Software Testing”, Pearson Education,2008.

**Reference books:**

1. Boris Beizer, “Software Testing Techniques”, Second Edition,Dreamtech, 2003
2. Elfriede Dustin, “Effective Software Testing”, First Edition, Pearson Education, 2003.

3. Renu Rajani, Pradeep Oak, " Software Testing–Effective Methods, Tools and Techniques ", Tata McGraw Hill, 2004.
4. Burnstein, "Practical Software Testing", Springer International Edition

**Four Year Degree Course in Engineering and Technology  
Course and Examination Scheme with Model AICTE Curriculum  
Seventh Semester Computer Science and Engineering**

**Course Code: BE103CS**

**Title of the Course: PE-IV: Cloud Computing**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	INTRODUCTION: Cloud Computing Introduction, Form, Collaboration to cloud, Working of cloud computing, pros and cons, benefits, developing cloud computing services, Cloud service development, discovering cloud services.	09
II	CLOUD COMPUTING FOR EVERYONE: Centralizing email communications, cloud computing for community, collaborating on schedules, collaborating on group projects and events, cloud computing for corporation, mapping schedules managing projects, presenting on road.	09
III	USING CLOUD SERVICES: Collaborating on calendars, Schedules and task management, exploring on line scheduling and planning, collaborating on event management, collaborating on contact management, collaborating on project management, collaborating on word processing, spreadsheets, and databases.	09
IV	OUTSIDE THE CLOUD: Evaluating web mail services, Evaluating instant messaging, Evaluating web conference tools, creating groups on social networks, Evaluating on line groupware, collaborating via blogs and wikis.	09
V	STORING AND SHARING: Understanding cloud storage, evaluating on line file storage, exploring on line book marking services, exploring on line photo editing applications, exploring photo sharing communities, controlling it with web based desktops.	09
<b>Total</b>		<b>45</b>

**Text Books:**

1. Enterprise Cloud Computing by Gautam Shroff, Cambridge
2. Michael Miller, " Cloud Computing", Pearson Education, New Delhi, 2009

**Reference Books:**

1. Google Apps by Scott Granneman Pearson
2. Cloud Security & Privacy by Tim Malhar, S. Kumaraswamy, S. Latif (SPD 'O'-REILLY)
3. Cloud Computing: A Practical Approach, Antóhy T Velte, et.al McGraw Hill
4. Cloud Computing Bible by Barrie Sosinsky, Wiley India
5. Stefano Ferretti et.al. QoS aware Clouds", 2010 IEEE 3rd International Conference on Cloud Computing

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**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Seventh Semester Computer Science and Engineering**

**Course Code: BE103CS**

**Title of the Course: PE-IV: Internet of Things**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	Introduction to Internet of Things –Definition and Characteristics of IoT, Physical Design of IoT – IoT Protocols, IoT communication models, Iot Communication APIs, IoT enabled Technologies – Wireless Sensor Networks, Cloud Computing, Big data analytics, Communication protocols, Embedded Systems, IoT Levels and Templates, Domain Specific IoTs – Home, City, Environment, Energy, Retail, Logistics, Agriculture, Industry, health and Lifestyle.	09
II	IoT and M2M – Software defined networks, network function virtualization, difference between SDN and NFV for IoT. Basics of IoT System Management with NETCOZF, YANG-NETCONF, YANG, SNMP NETOPEER.	09
III	Introduction to Python - Language features of Python, Data types, data structures, Control of flow, functions, modules, packaging, file handling, data/time operations, classes, Exception handling. Python packages - JSON, XML, HTTP Lib, URL Lib, SMTP Lib.	09
IV	IoT Physical Devices and Endpoints - Introduction to Raspberry PI - Interfaces (serial, SPI, I2C). Programming – Python program with Raspberry PI with focus of interfacing external gadgets, controlling output, reading input from pins.	09
V	IoT Physical Servers and Cloud Offerings – Introduction to Cloud Storage models and communication APIs. Webserver – Web server for IoT, Cloud for IoT, Python web application framework. Designing a RESTful web API.	09
<b>Total</b>		<b>45</b>

**Text Books:**

1. Internet of Things - A Hands-on Approach, Arshdeep Bahga and Vijay Madisetti, Universities Press, 2015, ISBN: 9788173719547
2. Getting Started with Raspberry Pi, Matt Richardson & Shawn Wallace, O'Reilly (SPD), 2014, ISBN: 9789350239759

**Reference Books:**

1. The Internet of Things: Key Applications and Protocols, Olivier Hersent, David Boswarthick & Omar Elloumi, Wiley publication

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7

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Seventh Semester Computer Science and Engineering**

**Course Code: BE103CS**

**Title of the Course: PE-IV: Data Analytics**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	Data Definitions and Analysis Techniques: Introduction to data analytics, Elements, Variables, and Data categorization, Levels of Measurement, Data management and indexing, Data in data analytics, NOIR topology, Nominal scale, Binary (Symmetric, Asymmetric), Ordinal scale, Interval and Ration scale, Data cube, Multidimensional Data Model,	09
II	Descriptive Statistics: Central Tendency Measures- Arithmetic mean, Weighted mean, Median, Mode, Percentile. Dispersion- Skewness, Kurtosis, Range, Interquartile range, Variance, Standard score, Coefficient of variation. Probability distribution: What is probability distribution, random variables, use of expected value in decision making, and various probability distributions.	09
III	Sampling and Sampling Distribution: introduction to sampling, random sampling, Introduction to sampling distribution. Design of experiment Distribution of Sample Means, Population, and Variance, Confidence Interval estimation.	09
IV	Basic analysis techniques: Statistical hypothesis generation and testing, Chi-Square test, t-Test, Analysis of variance, Correlation analysis, Maximum likelihood test	09
V	Data analysis techniques: Regression analysis, Classification techniques, Clustering, Association rules analysis.	09
<b>Total</b>		<b>45</b>

**Text/Reference Books:**

1. Probability & Statistics for Engineers & Scientists (9th Edn.), Ronald E. Walpole, Raymond H. Myers, Sharon L. Myers and Keying Ye, Prentice Hall Inc.
2. The Elements of Statistical Learning, Data Mining, Inference, and Prediction (2nd Edn.), Trevor Hastie Robert Tibshirani Jerome Friedman, Springer, 2014
3. Introduction to probability and, statistics for engineers and scientist, Sheldon M. Ross, Elsevier.
4. Statistics for Management, Richard I. Levin & David S. Rubin, Pearson Education
5. Probability and Statistics, Murray R. Spiegel, John J. Schiller, R. Alu Srinivasan, McGraw Hill Education.
6. McKinney, W. (2012). Python for data analysis: Data wrangling with Pandas, NumPy, and IPython. "O'Reilly Media, Inc."
7. Swaroop, C. H. (2003). A Byte of Python. Python Tutorial.

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**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Seventh Semester Computer Science and Engineering**

**Course Code:** BE103CS

**Title of the Course:** PE-IV: Web and Internet Technology

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	<b>Introduction to XML:</b> What is XML, XML versus HTML, XML terminology, XML standards, XML syntax checking, The idea of markup, XML Structure, Organizing information in XML, Creating Well-formed XML, XML Namespaces. DTD- Introduction to DTD, Document Type Declaration, Element Type Declaration, Attribute Declaration, Conditional Section, Limitations of DTD, <b>Parsing XML:</b> Introduction to Parser, Parsing approaches, JAXP, JAXP and SAX, JAXP and DOM., <b>Extensible Stylesheet Language(XSL):</b> Introduction to XSL, overview, XPATH, XSLT – templates, creating elements and attributes, looping and sorting, conditional processing, defining variables.	09
II	<b>Introduction to Servlet:</b> History of web applications, support for web application, power of servlet, a Servlet's job, basic servlet code, configuration of apache tomcat server, set up Development Environment, Compiling and Deploying Servlet, Web Application - directory structure, Deployment descriptor, Assigning custom URLs to servlet., <b>Structure of Servlet:</b> HTTP basic, The servlet API, Page Generation, The Servlet Life Cycle – The Service method, doGet and doPost methods, Init method, destroy method, The Single Thread Model Interface, <b>Retrieving Information:</b> Servlet Init Parameters and Parameter Names, Information about server, Context Init Parameters, The Client Information – information about client machine, Restricting Access, Information about user, The Request – Request Parameter, path information, Serving files, Serving Resources, Request Headers, Handling Post Request,	09
III	<b>Creating Response in Servlet:</b> The Structure of response, sending normal response, using persistent connection, response buffering, controlling response buffer, status codes, setting status code, HTTP headers, setting HTTP headers, Redirecting request, client pull, configuring error pages, logging, Exceptions. <b>Session Management in servlet:</b> Session tracking, Session tracking Mechanisms – Hidden Form Fields, URL Rewriting, cookies, Session Tracking APIs, session life cycle, Setting session timeout, life cycle methods, manually invalidating session, Session ID, non cookie Fallbacks.	09
IV	<b>JSP Application Development:</b> Generating Dynamic Content, Using Scripting Elements Implicit JSP Objects, Conditional Processing - Displaying Values Using an Expression to Set an Attribute, Declaring Variables and Methods Error Handling and Debugging Sharing Data Between JSP pages, Requests, and Users Passing Control and Data between Pages – Sharing Session and Application Data.	09
V	<b>Database Access:</b> Database Programming using JDBC, Studying Javax.sql.* package, Accessing a Database from a JSP Page, Application - Specific Database Actions, Deploying JAVA Beans in a JSP Page, Introduction to struts framework. <b>Introduction to ASP.NET:</b> The Evolution of Web Development, Important facts about ASP.NET.	09
<b>Total</b>		<b>45</b>

B.F.

**Text Books:**

1. XML and Related Technologies – Atul Kahate , Pearson Education.
2. Java Servlet Programming – Jason Hunter, SPD O'REILLY.
3. Core-Servlet and Java Server Pages Volume -1 2nd Edition – Marty Hall, Larry Brown, Pearson Education.
4. Pro ASP.NET 3.5 in C# 2008, Matthew MacDonald, Wiley-APRESS publication.
5. Beginning PHP5, WROX Publications

**Reference Books:**

1. The XML Handbook – Charls Goldfarb.
2. Learning XML – Erik Ray, SPD O'REILLY 2nd Edition.
3. XML in Nutshell – Elliotte RustyHarold, SPD O'REILLY, 3rd Edition.
4. Head First – Servlet and JSP - Bryan Basham, SPD O'REILLY, 2nd Edition.

B  
7

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Seventh Semester Computer Science and Engineering**

**Course Code:** BE104CS  
**Title of the Course:** OE-II: Cyber Law and Ethics

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	<b>Introduction to Cyber Law</b> Information security: fundamentals, Threats to security, Evolution of computer technology, emergence of cyber space. Cyber Jurisprudence, Jurisprudence and law, Doctrinal approach, Consensual approach, Real Approach, Cyber Ethics, Cyber Jurisdiction, Hierarchy of courts, Civil and criminal jurisdictions, Cyberspace-Web space, Web hosting and web Development agreement.	09
II	<b>Information Technology Act</b> Overview of IT Act, 2000, Amendments and Limitations of IT Act, Digital Signatures, Cryptographic Algorithm, Public Cryptography, Private Cryptography, Electronic Governance, Legal Recognition of Electronic Records, Legal Recognition of Digital Signature, Certifying Authorities, Cyber Crime and Offences, Network Service Providers Liability, Cyber Regulations Appellate Tribunal, Penalties and Adjudication.	09
III	<b>Cyber Law and Related Legislation:</b> Patent Law, Trademark Law, Copyright, Software – Copyright or Patented, Domain Names and Copyright disputes, Electronic Data Base and its Protection, IT Act and Civil Procedure Code, IT Act and Criminal Procedural Code, Relevant Sections of Indian Evidence Act, Relevant Sections of Bankers Book Evidence Act, Relevant Sections of Indian Penal Code, Relevant Sections of Reserve Bank of India Act, Law Relating To Employees And Internet, "Alternative Dispute Resolution , Online Dispute Resolution (ODR).	09
IV	<b>Electronic Business and Legal Issues:</b> Evolution and development in E-commerce, paper vs paper less contracts E-Commerce models- B2B, B2C, E security. Business, taxation, electronic payments, supply chain, EDI, E-markets, Emerging Trends.	09
V	<b>Cyber Ethics:</b> The Importance of Cyber Law, Significance of cyber Ethics, Need for Cyber regulations and Ethics. Ethics in Information society, Introduction to Artificial Intelligence Ethics: Ethical Issues in AI and core Principles, Introduction to Block chain Ethics.	09
<b>Total</b>		<b>45</b>

**Text/Reference Books:**

1. Cyber Laws: Intellectual property & E Commerce, Security- Kumar K, dominant Publisher
2. Cyber Ethics 4.0, Christoph Stuckelberger, Pavan Duggal, by Globethic
3. Information Security policy & Implementation Issues, NIIT, PHI
4. Computers, Internet and New Technology Laws, Karnika Seth, Lexis Nexis Butterworths Wadhwa Nagpur.
5. Legal Dimensions of Cyber Space, Verma S, K, Mittal Raman, Indian Law Institute, New Delhi,
6. Cyber Law, Jonthan Rosenoer, Springer, New York, (1997).
7. The Information Technology Act, 2005: A Handbook, OUP Sudhir Naib,, New York, (2011)

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Seventh Semester Computer Science and Engineering**

**Course Code:** BE103CS  
**Title of the Course:** OE-II: Indian Music System

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	<b>Origin and development of Indian music:</b> Study of the Historical Development of Indian Music from Vedic to Modern period, Ancient Medieval and Modern Musicologist and Scholars, Study of ancient, Medieval and Modern Treatises in Indian Music, Contribution of Western Scholars to Indian Music:	09
II	<b>Indian music system:</b> Introduction: Hindustani music, Carnatic music, light classical music, folk music, 3 components of music system : Melody, Drone, Rhythm; Microtones , Scale, Raga; Instruments and its Classification : Classification of Indian Musical Instruments in Ancient, Medieval and Modern period; Origin, evolution and famous artist of these Instruments.	09
III	<b>Computational approach to melodic analysis of Indian music:</b> Tonic identification, melody extraction, intonation analysis, motif discovery and characterization, melodic pattern discovery challenges: pitch variation, timing variation, added ornamentation, data pre-processing, melodic similarity, raga recognition, raga characterization.	09
IV	<b>Music and Psychology:</b> psychological benefits of Indian music, music- mood - stress, music and improvement in concentration, music and behaviour, can music change the personality? Reinvention of neuroscience in music therapy.	09
V	Globalization of Indian music, influence on other genres, influence on national music, scope in music engineering : sound engineering, audio engineering, sound recordist, mixing engineers.	09
<b>Total</b>		<b>45</b>

**Text/Reference Books:**

1. Fundamentals of indian music By Swatantra Sharma
2. Music Systems in India (A Comparative Study of Some of The Leading Music Systems of The 15th, 16th, 17th, and 18th Centuries) By V. N. Bhatkhande, Eastern book linkers.
3. Dictionary of Music Therapy by T. V. Sairam

B.  
7

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Seventh Semester Computer Science and Engineering**

**Course Code:** BE105CS  
**Title of the Course:** TCP/IP and Internet: Lab

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	02	01	25	25	50

List of Practical's	
	Students should perform 10-12 Experiments from the given list.
1	Study of TCP/IP Protocol Suit
2	Study of ARP & RARP
3	Study of Routing Protocol, Routing algorithm
4	Study of TCP, IP and UDP Protocol
5	To study addressing, subnetting, and forwarding techniques
6	To build and Configure TCP/IP LAN topology
7	To build and configure the DHCP
8	To configure DNS Server
9	To study Client-Server concepts using Socket programming
10	To study File Transfer Protocol
11	To Study Remote File Access Protocol
12	To Study length IP subnet address using IP address 192.168.0.0 and Subnet Mask 255.255.224.0
13	Study of DNS

B.  
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**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Seventh Semester Computer Science and Engineering**

**Course Code: BE106CS**

**Title of the Course: Software Testing & Quality Assurance: Lab**

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	02	01	25	25	50

List of Practical's	
	Students should perform 10-12 Experiments from the given list.
1	Write programs in C- Language to demonstrate the working of the following constructs: i) do.. .while ii) while....do iii) if...else iv) switch v) for.
2	A program written in C- language for Matrix Multiplication fails' Introspect the causes for its failure and write down the possible reasons for its failure.
3	Take any system (e.g. ATM system) and study its system specifications and report various bugs.
4	Write and study various Testing Levels in details and TEST GOALS, POLICIES, PLANS, AND DOCUMENTATION.
5	Write the test cases for any known application (e.g. Banking application)
6	Write the test cases for GMAIL. i) INBOX FUNCTIONALITY ii)COMPOSE MAIL FUNCTIONALITY
7	Write the test cases for FACEBOOK, TWITTER etc. i) USER TIMELINE TEST CASES ii)FRIENDS AND THEIR TEST CASES iii) FACEBOOK NOTIFICATION TEST SCENARIO.
8	Write various test cases for USER LOGIN PAGES.
9	Create a test plan document for any application (e.g. Library Management System).
10	Study of any web testing tool (e.g. Selenium)
11	Write the Test Cases for any piece of code and Calculate Cyclomatic complexity.
12	Selenium IDE Demo Installation
13	Conduct a test suite for any two web sites.
14	Installation of Selenium server and demonstrate it using a script in Java/PHP.
15	Write and test a program to login a specific web page. (Using JUnit)

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Seventh Semester Computer Science and Engineering**

**Course Code:** TE208CS  
**Title of the Course:** Project-I

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	06	06	75	75	150

	<b>Project-I Guidelines:</b>
1	Project is a team activity having 3-5 students maximum in a team.
2	Project may be a complete Software or a combination of hardware and software
4	After interactions with Guide/Project coordinator and based on comprehensive literature survey/need analysis, the student shall identify the title and define the aim and objectives of Project.
5	Student is expected to detail out specifications, methodology, resources required, critical issues involved in design and implementation. Students should submit the detailed proposal within first week of the semester.
6	The student is expected to exert on Analysis, Design, development and testing of the proposed work as per the schedule.
7	The Student is expected to carry out the following: 1. Selection of a Major Project Title 2. Extensive Literature Review of the chosen topic 3. Presentation of overall idea about the project in front of a panel of expert
8	Students in team must publish at least one research paper in a peer reviewed (refereed) journals during Project-I or Project-II.
9	If Research paper is not completed in seventh semester, it is mandatory to be completed in eighth semester before final internal submission.
10	On completion of above mentioned activities of project work, the student has to prepare a Seminar report in the specified format and deliver a seminar on project work before final internal submission. Evaluation of project work will be on the basis of quality of work carried out, Paper Published, Submitted Report, Seminar and Viva-Voce.

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**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Eighth Semester Computer Science and Engineering**

**Course Code:** BE201CS  
**Title of the Course:** Computer System Security

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	Security Attacks (Interruption, Interception, Modification and Fabrication), Security Services (Confidentiality, Authentication, Integrity, Non-repudiation, access Control and Availability) and Mechanisms, A model for Internetwork security, Internet Standards and RFCs, Buffer overflow & format string vulnerabilities, TCP session hijacking, ARP attacks, route table modification, UDP hijacking, and man-in-the-middle attacks.	09
II	Conventional Encryption Principles, Conventional encryption algorithms, cipher block modes of operation, location of encryption devices, key distribution Approaches of Message Authentication, Secure Hash Functions and HMAC.	09
III	Public key cryptography principles, public key cryptography algorithms, digital signatures, digital Certificates, Certificate Authority and key management Kerberos, X.509 Directory Authentication Service.	09
IV	Email privacy: Pretty Good Privacy (PGP) and S/MIME. IP Security Overview, IP Security Architecture, Authentication Header, Encapsulating Security Payload, Combining Security Associations and Key Management. Web Security Requirements, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).	09
V	Basic concepts of SNMP, SNMPv1 Community facility and SNMPv3. Intruders, Viruses and related threats, Firewall Design principles, Trusted Systems. Intrusion Detection Systems.	09
<b>Total</b>		<b>45</b>

**Text Books:**

1. Network Security Essentials (Applications and Standards) by William Stallings Pearson Education.
2. Cryptography & Network Security by Atul Kahate , Tata Mc Graw Hill

**Reference Books:**

1. Fundamentals of Network Security by Eric Maiwald (Dreamtech press)
2. Network Security - Private Communication in a Public World by Charlie Kaufman, Radia Perlman and Mike Speciner, Pearson/PHI.
3. Cryptography and network Security, Third edition, Stallings, PHI/Pearson
4. Principles of Information Security, Whitman, Thomson.
5. Network Security: The complete reference, Robert Bragg, Mark Rhodes, TMH
6. Introduction to Cryptography, Buchmann, Springer.

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Eighth Semester Computer Science and Engineering**

**Course Code:** BE202CS  
**Title of the Course:** PE-V: Soft Computing

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	Soft Computing: Introduction, requirement, different tools and techniques. Fuzzy sets and Fuzzy logic: Introduction, Fuzzy sets versus crisp sets, operations on fuzzy sets, Extension principle, Fuzzy relations and relation equations, Fuzzy numbers, Linguistic variables, Fuzzy logic, Linguistic hedges, Applications, fuzzy controllers, fuzzy pattern recognition, fuzzy image processing, fuzzy database.	09
II	Artificial Neural Network: Introduction, basic models, Hebb's learning, Adaline, Perceptron, Multilayer feed forward network, Back propagation, Different issues regarding convergence of Multilayer Perceptron, Competitive learning, Self-Organizing Feature Maps, Adaptive Resonance Theory, Associative Memories, Applications.	09
III	Evolutionary and Stochastic techniques: Genetic Algorithm (GA), different operators of GA, analysis of selection operations, Hypothesis of building blocks, Schema theorem and convergence of Genetic Algorithm, Simulated annealing and Stochastic models, Boltzmann Machine, Applications.	09
IV	Rough Set: Introduction, Imprecise Categories Approximations and Rough Sets, Reduction of Knowledge, Decision Tables, and Applications.	09
V	Hybrid Systems: Neural-Network-Based Fuzzy Systems, Fuzzy Logic-Based Neural Networks, Genetic Algorithm for Neural Network Design and Learning, Fuzzy Logic and Genetic Algorithm for Optimization, Applications.	09
<b>Total</b>		<b>45</b>

**Text/Reference Books:**

1. Neural Fuzzy Systems, Chin-Teng Lin & C. S. George Lee, Prentice Hall PTR.
2. Fuzzy Sets and Fuzzy Logic, Klir & Yuan, PHI, 1997.
3. Neural Networks, S. Haykin, Pearson Education, 2ed, 2001.
4. Genetic Algorithms in Search and Optimization, and Machine Learning, D. E. Goldberg, Addison-Wesley, 1989.
5. Neural Networks, Fuzzy logic, and Genetic Algorithms, S. Rajasekaran & G. A. V. Pai, PHI.
6. Neuro-Fuzzy and Soft Computing, Jang, Sun, & Mizutani, PHI.
7. Learning and Soft Computing, V. Kecman, MIT Press, 2001.
8. Rough Sets, Z. Pawlak, Kluwer Academic Publisher, 1991.
9. Intelligent Hybrid Systems, D. Ruan, Kluwer Academic Publisher, 1997.

B<sub>6</sub>

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Eighth Semester Computer Science and Engineering**

**Course Code:** BE202CS  
**Title of the Course:** PE-V: Advanced Computer Architecture

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	Trends towards parallel processing, parallelism in uniprocessor systems, parallel computer structures, architectural classification schemes, parallel processing applications, memory hierarchy in parallel processing systems, addressing schemes. Pipeline concept, linear pipelining and space time diagram, classification of pipeline processors, nonlinear pipeline and reservation table, interleaved memory organization, arithmetic pipelines, principles of designing pipeline processors, vector processing.	09
II	SIMD array processors, organization, masking and routing mechanisms, inter PE communications, SIMD inter connection networks, single stage and multi stage networks, mesh connected Illiac networks, parallel shifter, shuffle exchange and omega networks, parallel algorithms for array processors, matrix multiplication, polynomial evaluation, parallel sorting, fast Fourier transform computation, associative array processor.	09
III	Multiprocessor architecture, loosely coupled and tightly coupled multiprocessor systems, processor characteristics, inter connection networks crossbar switch and multi port memories, multi stage networks, banyan and delta networks parallel memory organization, multiprocessing operating systems, classification and requirements, software requirements for MPS, language features to exploit parallelism, multi processor scheduling strategies, parallel algorithms.	09
IV	Data flow computers, control flow versus data flow, data flow computer architectures, data flow graphs, data flow languages, Dennis and Irvine machines, dataflow design alternatives, dependence driven and multi level event driven approaches, VLSI computing structures, systolic array architecture, VLSI matrix arithmetic processor.	09
V	Performance evaluation of computers, measurements and parameters, stochastic model simulation model, study of architecture of Cray and Cyber super computers, massively parallel processor systems, image processing on MPP, C.mmp multiprocessor system, crazy X MP super computer.	09
<b>Total</b>		<b>45</b>

**Text Book/s:**

1. Kai Hwang, Faye A. Briggs, "Computer Architecture and Parallel Processing" McGraw-Hill international Edition

**Reference Book/s:**

1. Kai Hwang, "Advanced Computer Architecture", Tata McGraw-Hill
2. William Stallings, "Computer Organization and Architecture, Designing for performance" Prentice Hall, Sixth edition.
3. Kai Hwang, Scalable Parallel Computing.
4. Harrold Stone, High performance computer Architecture.
5. Richard Y. Kain, Advanced Computer Architecture
6. <http://www.intel.com/products/processor> (for Intel Itanium Processor)



**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Eighth Semester Computer Science and Engineering**

**Course Code: BE202CS**

**Title of the Course: PE-V: Enterprise Resource Planning**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	ERP – Curtain Raiser: An overview, Accommodating variety, Integrated Management Information, Seamless Integration, Supply Chain Management, Resource Management, Integrated data model, Scope, Technology, Benefits of ERP, Evolution, ERP revised, ERP & Modern Enterprise, problems.	09
II	ERP & Related Technologies: MAN overview, Business Process Reengineering(BPR), Management Information System(MIS), Decision Support Systems(DSS), Executive Information Systems (EIS), Data Warehousing, Data Mining, OLAP.	09
III	Business Engineering & ERP: An overview, What is Business Engineering (BE)? ERP Implementation and the Competitive Advantage: Significance of BE, Principles of BE, BPR, ERP & IT, BE with IT, ERP and Management concerns, problems. Business Modeling: An overview, Building the Business Model, problems.	09
IV	The ERP Market & Making of ERP: An overview, Role of consultants, vendors & users, customization, precautions, ERP: Post-implementation options, ERP implementation Lifecycle, Guidelines for ERP implementation, problems. ERP & competitive strategy, problems.	09
V	An overview, SAP AG, SAP R/3 Applications, Baan, Oracle, PeopleSoft, JD Edwards, Examples of Indian ERP packages, problems. An overview, Market Dynamics & Competitive Strategy, problems. Future Directions in ERP. Various ERP Case studies.	09
<b>Total</b>		<b>45</b>

**Text Books:**

1. Enterprise Resource Planning – Concepts & Practice (Second Edition) By V. K. Garg & N.K. Venkitakishnan (PHI)
2. Enterprise Resource Planning- Alexis Leon (TMH)

**Reference Books:**

1. ERP Demystified – By Alexis Leon (TMH)

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Eighth Semester Computer Science and Engineering**

**Course Code: BE202CS**

**Title of the Course: PE-V: Parallel Computing**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	Introduction to parallel computing: Need of ever increasing performance, building parallel systems, need to write parallel programs, Parallel hardware, Parallel Software, Coordinating the processes/threads, Shared-memory, Distributed-memory, Programming hybrid systems.  Parallel Programming Platforms: Implicit parallelism, Limitation of Memory system performance, Dichotomy of parallel computing platforms, physical organization of parallel platforms, communication cost in parallel machines.  Principles of Parallel Algorithm Design: Preliminaries, Decomposition Techniques. Characteristics of Tasks and Interactions, Mapping Techniques for Load Balancing.	09
II	Dependence Concepts: Basic introduction of dependence in single loop and double loop, index and iteration spaces and perfect loop nest, test for dependences, GCD test, Bound test.	09
III	Shared-Memory Programming with OpenMP: What is OpenMP, creating team of threads, OpenMP Memory model, thread synchronization, Directives, Sharing the Work among Threads in an OpenMP Program : Loop Construct, The Sections Construct , The Single Construct , Workshare Construct, Combined Parallel Work-Sharing Constructs ,Clauses to Control Parallel and Work-Sharing Constructs, OpenMP Synchronization Constructs ,Interaction with the Execution Environment, OpenMP Clauses : If Clause , Num-threads Clause, Ordered Clause, Reduction Clause, Copyin Clause ,Copyprivate Clause ,Advanced OpenMP Constructs: Nested Parallelism , Flush Directive , Thread private Directive.	09
IV	Distributed-Memory Programming with MPI : Compilation and execution, MPI programs ,MPI_Init and MPI_Finalize, Communicators: MPI_Comm_size and MPI_Comm_rank, MPI_Send ,MPI_Recv, Message matching, Semantics of MPI_Send and MPI_Recv, Dealing with I/O, Collective communication, MPI derived data types.	09
V	Compute Unified Device Architecture (CUDA): CUDA Architecture, Introduction to CUDA C, Kernel Call, Passing parameters, Querying Devices, Thread Cooperation: Splitting blocks, Shared Memory and Synchronization.	09
<b>Total</b>		<b>45</b>

**Text/Reference Books:**

1. Introduction to Parallel Computing, Ananth Grama, Anshul Gupta, George Karypis, Vipin Kumar, Addison-Wesley.
2. Dependence Concept, Utpal Banerjee, Intel Corporation
3. Using OpenMP, Barbara Chapman, Gabriele Jost, MIT Press
4. Using MPI – Portable Parallel Programming with the Message–Passing Interface 3e (Scientific and Engineering Computation) ,William Group , Ewing Lusk, MIT Press
5. CUDA by Example: An Introduction to General- Purpose GPU Programming, Jason Sanders, Edward Kandrot, Addison-Wesley

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Eighth Semester Computer Science and Engineering**

**Course Code: BE203CS**

**Title of the Course: OE-III: History of Science & Technology**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	<b>Historical Perspective:</b> The nature of science and technology, Roots of science and technology in India, Science and society, Scientists and society, Science and Faith and the rise of applied sciences. <b>Science and Technology- The Beginning:</b> Engineering and Architecture in Ancient India: Prehistoric Period, Architecture during Harappan Period, Vedic Period , Post-Vedic Period, Buddhist Stupa and Viharas, Temple Architecture.	09
II	<b>MATHEMATICS AND ASTRONOMY:</b> Introduction, Baudhayana, The Sutras of Baudhāyana, The Mathematics in Sulbasutra, Weaving mathematics into beautiful poetry: Bhaskaracarya. Aryabhata: Biography, Time and place of birth, Education. Works, Mathematics: Place value system and zero, Approximation of $\pi$ , Trigonometry, Indeterminate equations. Astronomy, Legacy, Brahmagupta: Biography and brief achievements, Brahmagupta's Contributions: Mathematics, Astronomy, Bhaskaracharya: Birth and Education of Bhaskaracharya, Siddhanta Shiromani, Bhaskar's Mathematics, Bhaskar's Astronomy, Astronomical Achievements of Bhaskaracharya, Varahamihira (505–587 CE): Works, Western influences, Contributions. Nagarjuna: Biography, Works of Nagarjuna, Contribution	09
III	<b>MEDICAL SCIENTIST OF ANCIENT INDIA (AYURVEDA &amp; YOGA):</b> Introduction, Susruta: Biography, Date of Sushruta, Place of Sushruta, Contribution of Sushruta, Charaka, About Charaka, Time Period of Charaka, Place of Charaka, Contribution Of Charaka, Patanjali: Name, His parents and his birth, His place of birth, His portrayal and iconography, His achievements, His contribution. History of Ayurveda, Rational foundations of Ayurveda, Ayurveda and allied disciplines, Ayurveda and modern medicine, Ayurveda and Yoga.	09
IV	<b>Science and Technological Developments in Major Areas</b> Development of research organizations like CSIR and DRDO: <b>Council of Scientific and Industrial Relation (CSIR):</b> Brief History of CSIR , A Proud Record, Scientific Publications, International Collaboration. <b>Defense Research Development Organization (DRDO):</b> Achievements And Programmes: Defence, Other Major Achievements: Advanced Computing and Software Products, Critical Electronic Components, Electronic and Strategic Materials, Radar and Communication Technologies, Missile Technologies, Agriculture and Life Science Technologies, National Centre for Automotive Testing, Underwater Research Facilities, R&D For Societal Benefits.  <b>Space Research</b> – Objectives of space programs, Geostationary Satellite Services – INSAT system and INSAT services, Remote sensing applications.  <b>Ocean Development</b> – Objectives of ocean development, Biological and mineral resources, Marine research and capacity building  <b>Biotechnology</b> – Applications of biotechnology in medicine, Biocatalysts, Food Biotechnology, Fuel and Fodder and Development of Biosensors. <b>Energy</b> – Research and development in conservation of energy, India's nuclear energy program, technology spin-offs. <b>Agriculture</b> -Origin and development, Ancient crops, Traditional practices, Development of biosensors and animal husbandry.	09



	Irrigational Development in India during Medieval Period, Irrigation in Medieval India: Textual Reference, Regional Trends of Water Management, Means and Methods of Irrigation during Sultanate and Mughal Era.	
V	<b>Policies and Planning for Science, Technology and Economic development in India:</b> a. Introduction, b. Policies and Plans after Independence: Nehru's vision of science for independent India, Science and technology developments in the new era. Science and technology developments during the Five Year Plan Periods and science and technology policy resolutions. c. R&D Expenditure d. Research Infrastructure e. S&T and Five Year Plans, Features and Impact of various Five Year Plans., Indian Industry and Industrial Research, Foreign Collaborations, Major S&T Achievements, Technology Missions, Perspective Plan for 2001 AD, d. Science and Technology Policy in India in the post-1990s Phase: An Assessment, Science and Technology Policy-2003, Science, Technology and Innovation Policy-2013	09
<b>Total</b>		<b>45</b>

### Text/Reference Books:

1. Kalpana Rajaram, Science and Technology in India, Published and Distributed by Spectrum Books (P) Ltd., New Delhi – 58.  
Srinivasan, M., Management of Science and Technology (Problems & Prospects), East-West Press (P) Ltd., New Delhi.
2. History of Science and Technology in india By Dr. Binod Bihari Satpathy
3. Anderson, R. S. (2010). Nucleus and Nation: Scientists, International Networks, and Power in India. Chicago and London: The University of Chicago Press.
4. Habib, S. Irfan and Raina, Dhruv 2007 (eds.). Social history of Science in Colonial India. New Delhi: Oxford University Press.
5. Kumar, Deepak. 1995 (2011). Science and the Raj: A Study of British India. New Delhi: Oxford University Press.

### Reference Books:

1. Ramasamy, K.A., and Seshagiri Rao, K., (Eds), Science, Technology and education for Developemnt, K., Nayudamma Memorial Science Foundation, Chennai – 8.
2. Kohili, G.R., The Role and Impact of Science and Technology in the Development of India, Surjeet Publications.
3. Government of India, Five Year Plans, Planning Commission, New Delhi.
4. Sharma K.D., and Quresh M.A., Science, Technology and Development, Sterling Publications (P) Ltd., New Delhi.
5. Sharma, P.V. Article on Charaka. In, P.V.Sharma's History of medicine in India (from antiquity to 1000 A.D.), Indian National Science Academy, New Delhi, India, First print: 1992.
6. Woods, James Haughton., (ed), The Yoga Sutras of Patanjali, Published for Harvard University by Ginn & Co., 1914.

27

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Eighth Semester Computer Science and Engineering**

**Course Code: BE203CS**

**Title of the Course: OE-III: Economic Policies in India**

Course Scheme					Evaluation Scheme (Theory)				
Lecture	Tutorial	Practical	Periods/week	Credits	Duration of paper, hrs	MSE	IE	ESE	Total
03	00	--	03	03	03	10	10	80	100

Unit	Contents	Hours
I	Economic Development and Growth Policies Economic Development & Social Opportunity - Development, Freedom and Opportunity on education & health, the government, the state & the market; Human Development-Essential Components of Human development; Indexing Human Development in India - indicators, scaling and composition; Recasting Planning in terms of Human Development.	09
II	Indian Political Economy (1980-2010) and Inclusive Growth, Poverty in India – estimates and methodological controversies; Human Poverty, entitlement, capability approach; Public Action and Social Inequality - public, its role, reach of inequalities, Social inequalities and economic reforms, basic equality and social security and Health care, local governance& social reforms.	09
III	Agriculture and Industrial Sectors of the Indian economy: Agriculture Growth and Industrial Performance in Indian - salient features of industrial and agriculture growth, links between agriculture and industry - production linkages, demand linkages, savings & investment linkages; Planning for Agriculture - 21st Century perspective, Indian agriculture - emerging perspectives and policy issues; Land System and its reforms in India - land reforms progress in post independent India. Impact of Structural Reorganization, emerging perspectives & Policy Issues; Critical appraisal of Food Security Policy; Water Resource Development Strategy for Accelerating Agriculture Production in India; Terms of Trade Between Agriculture and Industry: Industrial growth in 80's – some issues; Government Policy Towards Public Sector Since 1991; Paradigm shift in Industrial Policy; Jobless Growth in Indian manufacturing in 2000s.	09
IV	Indian Planning: Objectives & strategy of Planning in India; Regional Planning Policy in India – regional imbalances in India and policy measures to remove regional imbalances, critical review of Regional Planning in India; Economic Growth and Social Attainment - the role of Development Strategy; Gender Responsive Budgeting and Gender Equity; Federal Finances- responsibilities and resources, division of functions, resource raising powers, transfer of resources through Twelfth and Thirteen finance Commission; Parallel Economy – causes and remedies, current status of the Black Money - Graying of India's Political economy.	09
V	Economic Reforms & External Sector: Growth & Macro Economic Imbalances in India-linkages between growth & fiscal & external balances, trends in fiscal & external deficits; Critical Appraisal of Economic Reforms; WTO - Uruguay Round of Final Act & its Implication for India, Impact of WTO on various aspects of Indian Economy, India's Role at Doha Ministerial Conference, Geneva Frame Work and update on Trade Negotiations; Foreign Trade Policy - Import – Export Policy in pre-reform period, New Trade Policy - The Reform Period, Foreign Trade Policy 2009-14; FDI in Multi-brand Trade & Safe Guards.	09
<b>Total</b>		<b>45</b>



**Text/Reference Books:**

1. Bardhan, Pranab (1994) : The Political Economy of Development in India; Oxford University Press, New Delhi
2. C.T. Kurian (1978) : Poverty Planning and Social Transformation - An Alternative in Development Planning Allied Publishers, New Delhi
3. V. M. Dandekar : The Indian Economy 1947-97; transforming traditional Agriculture Vol. I'
4. BimalJalan : Indian Economic Crisis : The Way Ahead; Oxford University Press, New Delhi 1992
5. India's Economic Policy Preparing for the 21st Century: Penguin. New Delhi, 1996.
6. A. P. 'Thirwall' Growth and Development, 6th Edition Macmillan Press Ltd., 1999.
7. Vijay Joshi: IMD Little; India's Economy Reforms; Oxford University Press. New Delhi, 1991-2001.
8. Usha Kapila Indian Economy since Independence; Vol. I, II & III, Academic Foundation. New Delhi.
9. Recent Developments in Indian Economy, Part 3 & 4 Academic Foundation. New Delhi. 1994 & 95.
10. Robert. E. B. Lucas and Gustar. F.; Indian Economy - Recent Development and Future Prospects. Oxford University Press, New Delhi, 1989
11. Amartya Sen, Poverty and Famine - An Essay on Entitlement and Deprivation Oxford University Press. New Delhi, 1982.
12. The Standard of Living: Tanner Lectures - Cambridge University Press, 1987.

**Four Year Degree Course in Engineering and Technology  
Course and Examination Scheme with Model AICTE Curriculum  
Eighth Semester Computer Science and Engineering**

**Course Code: BE204CS**

**Title of the Course: Computer System Security: Lab**

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	02	01	25	25	50

List of Practical's	
	The student is expected to perform 10-12 practicals based on following topics.
1	Practical 1 & 2 should be based on Security Services, TCP session, Routing, UDP.
2	Practical 3 & 4 should be based on Encryption algorithms, Hash Functions and HMAC.
3	Practical 5 & 6 should be based on Public key cryptography, Private key cryptography algorithms, digital signatures, digital and key management Kerberos, X.509 Directory Authentication Service.
4	Practical 7, 8 & 9 should be based on Email, IP Security, Web Security, Secure Socket Layer (SSL) and Transport Layer Security (TLS), Secure Electronic Transaction (SET).
5	Practical 10, 11 & 12 should be based on SNMP, Viruses and threats, Intrusion Detection Systems.

**Four Year Degree Course in Engineering and Technology**  
**Course and Examination Scheme with Model AICTE Curriculum**  
**Eighth Semester Computer Science and Engineering**

**Course Code:** TE208CS  
**Title of the Course:** Project-II

Course Scheme					Evaluation Scheme (Laboratory)		
Lecture	Tutorial	Practical	Periods/week	Credits	TW	POE	Total
--	--	01	06	06	75	75	150

	<b>Project-II Guidelines:</b>
1	As the Major Project topic has already been chosen and Literature Survey of Project has also been completed in Seventh Semester under Project-I. The Student is expected to carry out the following 1. Formulation of Scope & Methodology for the proposed study. 2. Implementation of project work 3. Carry out necessary experimentation for analysis and testing of the project work
2	If Research paper is not completed in seventh semester, it is mandatory to be completed in eighth semester before final internal submission.
3	On completion of above mentioned activities of project work, the student has to prepare a project report in the specified format and deliver a seminar on project work before final submission. Evaluation of project work will be on the basis of quality of work carried out, Paper Published, Submitted Report, Seminar and Viva-Voce.

