



**List of Courses Focus on Employability/
Entrepreneurship/SkillDevelopment**

Department : Computer Science & Engineering

Programme Name : B.Tech.

Academic Year: 2021-22

List of Courses Focus on Employability/Entrepreneurship/Skill Development

Sr.No.	Course Code	Name of the Course
1.	CS203TES06	Digital logic & Design
2.	CS203TPC01	IT workshop (C++/python)
3	CS203TPC02	Computer Network
4	CS203TPC03	Computer Organization & Architecture
5	CS203TBS05	Mathematics III (Numerical Methods)
6	CS204TPC04	Discrete Mathematics
7	CS204PES07	Electronic Device & Circuits Lab
8	CS204TPC04	Discrete Mathematics
9	CS204TES07	Electronic Device & Circuits
10	CS204TPC04	Discrete Mathematics
11	CS204TES07	Electronic Device & Circuits
12	CS05TES05	Microprocessor and Interfaces
13	CS05TPC08	Relational Database Management System
14	CS05TPC09	Formal Language and Automata Theory
15	CS05TPC10	Parallel Computing
16	CS06PPC08	Java Lab
17	CS05TPE01	Software Engineering
18	CS06TPC11	Design and Analysis of Algorithms
19	CS06TPC12	Java
20	CS06TPC13	Computer Graphics
21	CS06TPE05	Digital Image Processing
22	CS06TOE01	Management Information System
23	CS06TPE07	Artificial Intelligence
24	CS07TPE09	TCP/IP Internetworking

25	CS07TPE11	DataMining
26	CS07TOE05	SoftComputing
27	CS07PPC09	Compiler DesignLab
28	CS07PPR03	MajorProject -I
29	CS08TPE13	NetworkSecurity
30	CS08TOE09	Enterprise ResourceManagement
31	CS08TOE11	WirelessSensor Network
32	CS08PPE01	NetworkSecurityLab
33	CS07TPC14	Compiler Design


विभागाध्यक्ष
Head
 संगणक विज्ञान एवं अभियांत्रिकी
 Computer Science & Engg.
 अभियांत्रिकी एवं प्रौ. अध्ययन शाला
 SOS, Engg. & Technology
 गु.घा. विश्वविद्यालय, बिलासपुर (छ.ग.)
 S.G.Vishwavidyalaya, Bilasour (C.G.)

**SCHEME FOR
 EXAMINATION B.TECH (FOUR YEAR)
 DEGREE
 COURSE COMPUTER SCIENCE AND ENGINEERING
 SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY GURU
 GHASIDAS VISHWA VIDYALAYA
 FOURTH YEAR, SEMESTER-VII
 W.E.F. SESSION 2021-22**

Branch:-Computer Science & Engg.

Year:IV

Sem-VII

S.No.	Code No.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS07TPEX	Professional Elective-I	3	0	0	30	70	100	3
2	CS07TPEX	Professional Elective-II	3	0	0	30	70	100	3
3	CS07TOEX	Open Elective-I	3	0	0	30	70	100	3
4	CS07TPC14	Compiler	3	0	0	30	70	100	3

		Design							
PRACTICAL									
1	CS07PPC09	Compiler DesignLab	0	0	3	30	20	50	1.5
2	CS07PPR03	MajorProject -I	0	0	6	60	40	100	3
3	CS07PPS01	Seminar	0	0	3	50	--	50	1.5
Total									18

Professional Elective-I & II Subject VII Sem.				Open Elective-I Subject VII Sem.			
S.No	Subject Code	Subject	Credits	S.No.	Subject Code	Subject	Credits
1	CS07TPE09	TCP/IP Internetworking	3	1	CS07TOE05	Soft Computing	3
2	CS07TPE10	Web Technology	3	2	CS07TOE06	Real Time System	3
3	CS07TPE11	Data Mining	3	3	CS07TOE07	Distributed System	3
4	CS07TPE12	Cyber Crime & Security	3	4	CS07TOE08	Visual Basic .Net	3

**SCHEME FOR EXAMINATION B.TECH
(FOUR YEAR) DEGREE
COURSE COMPUTERS SCIENCE AND ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING & TECHNOLOGY
GUJRATI GHASIDAS VISHWA VIDYALAYA
FOURTH YEAR, SEMESTER-VIII
W.E.F. SESSION 2021-22**

Branch:- Computer Science & Engg.

Year: IV

Sem- VIII

S.No.	Code No.	Subject	Periods			Evaluation Scheme			Credits
			L	T	P	IA	ESE	Total	
1	CS08TPEX	Professional Elective-I	3	0	0	30	70	100	3
2	CS08TOEX	Open Elective-I	3	0	0	30	70	100	3
3	CS08TOEX	Open Elective-II	3	0	0	30	70	100	3
PRACTICAL									
1	CS08PPEX	Professional Elective-I Lab	0	0	3	30	20	50	1.5
2	CS08PPR04	Major Project-II	0	0	12	120	80	200	6
Total									16.5

Professional Elective-I Subject VIII Sem.				Open Elective-I & II Subject VIII Sem.			
S.No	Subject Code	Subject	Credits	S.No	Subject Code	Subject	Credits
1	CS08TPE13	Network Security	3	1	CS08TOE09	Enterprise Resource Management	3
2	CS08TPE14	Mobile Application Development	3	2	CS08TOE10	Information Retrieval Systems	3
3	CS08TPE15	Cloud Computing	3	3	CS08TOE11	Wireless Sensor Network	3
4	CS08TPE16	Big Data Analysis	3	4	CS08TOE12	Machine Learning	3

Professional Elective Subject Lab VIII Sem			
S.No	Subject Code	Subject	Credits
1	CS08PPE01	Network Security Lab	1.5
2	CS08PPE02	Mobile Application Development Lab	1.5

3	CS08PPE03	CloudComputingLab	1.5
4	CS08PPE04	BigDataAnalysisLab	1.5

SubTitle:TCP/IPINTERNETWORKING		
SubCode:CS07TPE09	No.ofCredits:3=3:0:0(L-T-P)	Nooflecturehours/ week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:36

COURSEOBJECTIVE:

1. Analyseanddifferentiate networkingprotocolsusedinTCP/IPprotocolsuite.
2. Implementthe conceptsofnamingandaddressingtoIPv4andtheir extensiontoIPv6.
3. Categorizeproblemssuchasreliabletransport,datadelay,congestionandflowcontrolanddescribethecongestioncontrol schemes used inTCP.
4. Discussthe Internetbest-efforttypeofserviceanditsimprovements.
5. DiscussthefunctionalityofATMnetwork andISDN.

UNIT No	SyllabusContent	No ofHours
1	Introduction: Introductiontointernetnetworking,OverviewofOSIModelTCP/IPprotocolsuite,Basicsofswitchingtechnologiesandswitches,Comparisons of different models, Gateways.	8
2	Internet Protocol: Purpose of Internet Protocol, Internet datagram, Options,Checksum,ARP and RARP RoutingMethods:RoutingTable, ICMP, IGMP. IP Addresses: Introduction, Address Classification, A sample internet withclassfuladdressing,Subnetting,Supernetting,Classlessaddressing,Securityatthe IPLayer,IPSec,IPv4 andIPv6 packetformats.	7
3	RoutingProtocols: UnicastRoutingProtocols:InteriorandExteriorrouting, RIP,OSPF, BGP, Multicasting: Introduction,MulticastRouting,MulticastRoutingProtocols, MulticastTrees, DVMRP,MOSPF,CBT,PIM, MBONE.	7
4	TransmissionControlProtocol: TCP: TCP operation, Segment, Sliding window, Silly window, Options, TCPstatemachine,Karn'sAlgorithm,Congestioncontrol-LeakybucketandTokenbucketalgorithms. UDP: UserDatagram,UDP operations,Checksumcalculation.	7

5	<p>TCP/ IP Over ATM Networks: ATM reference model, ATM Switch, Interconnection Network, Virtual circuit in ATM, Paths, Circuits and identifiers, ATM cell transport and adaptation layers, packet type and multiplexing, IP Address binding in an ATM Network, Logical Subnet Concept and Connection Management. ISDN and B-ISDN.</p>	7
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COURSE OUTCOMES: The students would have learnt

- CO1: Understand the functions of each layer of TCP/IP model.
- CO2: Understand the functions of different Protocols.
- CO3: Understand the congestion control provided by the protocols.
- CO4: Understand the Quality of Services mechanism provided by protocol.
- CO5: Understand the concept of ATM and ISDN Network.

Text Books:

1. Internetworking with TCP/IP by Comer, Vol. 1, PHI Pub.
2. TCP/

IP Protocols suite by Behrouz A. Forouzan., TMH Pub. Reference

Books:

1. Computer Networking by James F. Kurose, Keith W. Ross, Pearson Education
2. TCP/IP Illustrated By Wright and Stevens, Vol. 2, Pearson Education
3. An Introduction to Computer Networks by Kenneth C. Mansfield Jr. James L.

SubTitle:DATAMINING		
SubCode:CS07TPE11	No.ofCredits:=3:0:0(L-T-P)	Nooflectrehours/ week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:36

COURSEOBJECTIVE:

1. **To introduce the concept of data Mining as an important tool for enterprise data management and as a cutting edge technology for building competitive advantage.**
2. **To enable students to effectively identify sources of data and process it for data mining**
3. **To make students well versed in all data mining algorithms, methods of evaluation.**
4. **To impart knowledge of tools used for data mining**

UNIT No	Syllabus Content	No of Hours
1	Data Warehousing: Introduction, Multidimensional data model, OLAP Operation, Warehouse schema, Data Warehouse Housing Architecture, Warehouse Server, Metadata, OLAP, engine. Data Mining: Introduction, KDD Vs Data mining, DBMS Vs DM, DM Techniques, Other mining problem, Issues & Challenges in DM, DM Application Areas.	8
2	Association Rules: Introduction, Methods to discover association rules, APriori Algorithm, Partition Algorithm, Pincer - Search algorithm, Dynamic Itemset counting algorithm, FP-tree Growth algorithm, Incremental algorithm, Border algorithm.	7
3	Clustering Techniques: Introduction, Clustering paradigms, Partitioning algorithms, k-Medoid Algorithm, CLARA, CLARANS, Hierarchical clustering, DBSCAN, BIRCH, CURE, Categorical clustering algorithms, STIRR, ROCK, CACTUS.	7
4	Decision Trees: Introduction, Tree construction principal, Best split splitting indices, Splitting criteria, Decision tree construction algorithm, CART, ID3, C4.5, CHAID, Decision tree construction with presorting, Rainforest, CLOUDS, BOAT.	7

5	Web Mining: Web mining, Web content mining, Web structure mining, Web usage mining, Text mining, Episode rule discovery for texts, Hierarchy of categories, Text clustering.	7
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COURSE OUTCOMES: The students would have learnt

C01: Demonstrate an understanding of the importance of data mining and the principles of business intelligence

C02: Organize and Prepare the data needed for data mining using pre processing techniques

C03: Perform exploratory analysis of the data to be used for mining.

Text Books:

1. Data Mining techniques, Arun K Pujari Universities press
2. Data Mining concepts & techniques, Jiawei Han, Micheline Kamber Morgan Kaufmann publisher Elsevier India

Reference Books:

1. **Data Mining methods for knowledge Discovery, Cios, Pedrycz, Swiniarski Kluwer academic publishers London**

SubTitle:SOFT COMPUTING		
SubCode:CS07TOE05	No.ofCredits:3=3:0:0(L-T-P)	Nooflecturehours/ week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:36

COURSEOBJECTIVE:

1. **To familiarize with soft computing concepts.**
2. **To introduce the fuzzy logic concepts, fuzzy principles and relations.**
3. **To Basics of ANN and Learning Algorithms.**
4. **ANN as function approximation.**
5. **Genetic Algorithm and its application to soft computing.**
6. **Hybrid system usage, application and optimization.**

UNIT No	Syllabus Content	No of Hours
1	Introduction to ANS Technology: Elementary Neurophysiology, models of a neuron, neural networks viewed as directed graphs, feedback from neurons to ANS, artificial intelligence and neural networks.	8
2	Learning & Training: Hebbian memory based, competitive, error-correction. Learning Credit Assignment Problem: supervised and unsupervised learning, memory models, recall and adaptation, network architecture, single layered feed forward networks, multilayered feed forward networks, recurrent networks, topologies.	7
3	Activation and Synaptic dynamics, stability and convergence. A survey of neural network models: Single layered perceptron, least mean square algorithm, multi-layered perceptrons, backpropagation algorithm XOR-problem, the generalized delta rule, BPN applications, Adalines and Madalines-Algorithm and applications.	7
4	Applications: The traveling salesperson problem, talking network and phonetic typewriter: Speech generation and Speech recognition, character recognition and retrieval, handwritten digital recognition.	7
5	Adaptive fuzzy systems: Introduction to Fuzzy sets, and operations, Examples of Fuzzy logic, Fuzzy Associative memories, fuzziness in neural networks, comparison of fuzzy and neural Truck-Backer upper control systems.	7

COURSE OUTCOMES: The students would have learnt

C01: List the facts and outline the different process carried out in fuzzy logic, ANN and Genetic Algorithms.

C02: Explain the concepts and meta-cognitive of soft computing.

C03: Apply Soft computing techniques to solve character recognition, pattern classification, regression and similar problems.

C04: Outline facts to identify process / procedure to handle real world problems using soft computing.

C05: Evaluate various techniques of soft computing to defend the best working

Text Books:

1. Artificial Neural Networks by B. Yagna Narayan
2. Neural Networks by James A. Freeman and David M. Strapetus

Reference Books:

1. **Neural Networks - A comprehensive foundation by Simon Haykin (LPE)**

Sub Title: COMPILER DESIGN		
Sub Code: CS07TPC14	No. of Credits: 3=3:0:0 (L-T-P)	No of lecture hours/ week: 03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours: 36

COURSE OBJECTIVE:

1. **Learn Basic Concept of compiler design.**
2. **To Discuss Six phases of compiler.**
3. **To Learn Basic functions of All Phases of Compiler.**
4. **To Learn Functions of Symbol Table and Error Handler**
5. **Develop ability to analyze a compiler.**

UNIT No	Syllabus Content	No of Hours
1	Overview of translation process. , Definition, Phases of Compiler, Lexical analysis: Introduction, Functions of lexical Analysis, automatic generation of lexical analyzers	8
2	Parsing Theory: Introduction, Difference between Top Down and bottom up parser. Different Types of Parsers: Predictive Parser, Shift-Reduce Parser, LR Parsers (SLR, CLR, LALR), Operator Precedence Parser Automatic generation of parsers.	7
3	Intermediate Code Generation: Different intermediate forms: Syntax tree, TAC, Quadruples, Triples, Indirect Triples, Syntax directed translation mechanism and attributed definition. Code Optimization: Global data flow analyses, A few selected optimizations like constant sub expression removal, loop invariant code motion, strength reduction etc.	7
4	Code Generation: DAG, Machine model, order of evaluation, register allocation and code selection, Code generation algorithm.	7
5	Run Time Theory Management: static memory allocation and stack based memory allocation schemes. Symbol table management.	7

COURSEOUTCOMES:Thestudentswouldhavelearnt

CO1:FundamentalsofCompilerDesign.

CO2:Translation Mechanism from Input to Output in Compiler.CO3:To know about compiler generation tools and techniquesCO4:To understand the importance of All phases of

TextBooks:

1. GulshanGoyal,CompilerDesign,sunIndiapublication.
2. AnamikaJain,compilerDesign.

ReferenceBooks:

1. A.V.Aho,RaviSethi,J.D.Ullman,CompilerstoolsandTechniques,AddisonWesley,1987.
2. WaiteW.N.andGoosG.,Compilerconstruction'springerverlag,1983.
3. TremblayJ.P.andSorenson,P.G.thetheoryandpracticeofcompilerwriting,McGrawHil,1984.

SubTitle:COMPILERDESIGNLAB	
SubCode:CS07PPC09	No.ofCredits:1.5=0:0:1.5(L-T-P)
ExamDuration:3hours	IA+ESE=30+20

LabOBJECTIVE:

1. **The understanding of compiler design.**
2. **To learn different phases of compiler and how to implement them.**
3. **To develop an awareness of the function and complexity of modern compilers.**
4. **Provide practical Knowledge and Skills for developing a compiler.**

Unit No.	Content	Teaching Hours
I, II, III, IV and V	<ul style="list-style-type: none"> • Write a C/C++ program to implement the design of a Lexical analyzer to recognize the tokens defined by the given grammar. • Write a program to find string identifier or not. • Write a program for NFA. • Write a program to find all terminals and non-terminals in a given grammar. • Write a program to find the FIRST of all Non-Terminals of Given Grammar. • Write a program to find the FOLLOW of all Non-Terminals of Given Grammar. • Write a C program to implement Type Checking • Write a Program to implement intermediate Code. • Write a program to optimize an Intermediate code Using Dead code Elimination • Write a program to optimize an Intermediate code Using Common Sub Expression Elimination 	18

LABOUR COMES: The students would have learnt

CO1: Understanding of basic Concept of Compiler Design.

CO2: Students will understand the practical

approach of Working of compiler. CO3: To know about compiler generation tools and techniques

CO4: To understand the importance of code

TextBooks:

1. CompilerDesign,GulshanGoyal,SunIndiapublication.
2. CompilerDesign,AnamikaJain

Reference Books:

1. ObjectOrientedProgrammingwithC++byMPBhaveS,A.Patekar,PearsonEducation
2. CompilerstoolsandTechniques,A.V.Aho,RaviSethi,J.D.Ullman,AddisonWesley,1987.
3. Compilerconstruction,WaiteW.N.andGoosG.,springerverlag,1983.
4. P.G.thetheoryandpracticeofcompilerwriting,TremblayJ.P.andSorenson,McGrawHil,1984.

SubTitle:NETWORKSECURITY		
SubCode:CS08TPE13	No.ofCredits:3=3:0:0(L-T-P)	Nooflecturehours/ week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:36

COURSEOBJECTIVE:

- Theconceptsofclassicalencryptiontechniquesandconceptsoffinite fieldsandnumbertheory.**
- And explore the working principles and utilities of various cryptographic algorithmsincludingsecretkeycryptography,hashesandmessage digests,andpublickeyalgorithms**
- Andexplorethedesignissuesandworkingprinciplesofvariousauthenticationprotocols, PKIstandards.**
- And explore various secure communication standards including Kerberos, IPsec, andSSL /TLSandemail**

UNIT No	SyllabusContent	No ofHours
1	Services , Mechanisms ,andAttacks , The OSISecurity Architecture , AModelforNetworkSecurity,symmetricciphermodel,substitutiontechniquesTranspositiontechniques, Steganography.	8
2	Block ciphers and the data encryption standard, Simplified DES, Block cipherprinciples , The data Encryption Standard ,The Strength ofDES. Differentialand Linear Cryptanalysis ,Block Cipher Designprinciples ,Block CipherModes of Operation , Evaluation Criteria for AES The AES cipher , TripleDES, blowfish , RC5, Rc4 Stream Cipher	7
3	Principlesofpublic: KeyCryptosystems,Public-Keycryptosystems,Applications for public -Key Cryptosystems , Requirements for public -KeyCryptosystems,Public-KeyCryptosystems,TheRSAAlgorithm,ComputationalAspects,TheSecurity ofRSA,Keymanagement,Distributionof public keys , Public -Key Distribution of Secret Keys , Differ -HellmannKeyExchange.	7
4	WebSecurity: WebSecurityThreats,WebTrafficSecurityApproaches,SSLArchitecture , SSL Record Protocol , Change Cipher Spec Protocol ,AlertProtocol,HandshakeProtocol,CryptographicComputations, TransportLayerSecurity, SecureElectronic Transaction.	7

5	Intruders: IntrusionTechniques,IntrusionDetection,AuditRecords,StatisticalAnomaly Detection ,Rule –Based Intrusion Detection ,The Base – RateFallacy, DistributedIntrusionDetection,Honeypots,IntrusionDetection ExchangeFormatFirewallDesignprinciples,FirewallCharacteristics, TypesofFirewalls ,Firewall Configurations.	7
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<p>COURSEOUTCOMES:Thestudentswouldhavelearnt</p> <p><u>CO1:Identifyinformationsecuritygoals,classicalencryptiontechniquesand acquirefundamentalknowledgeontheconceptsoffinitefieldsandnumber theory.</u></p> <p><u>CO2:Understand,compareandapplydifferentencryptionanddecryptiontechniques tosolveproblemsrelatedtoconfidentialityandauthentication.</u></p> <p><u>CO3:Applytheknowledgeofcryptographicchecksumsandevaluatetheperformanceofdifferentmessagedigestalgorithmsforverifyingtheintegrity ofvariousmessagesizes</u></p>
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TextBooks:

1. CryptographyAndNetworkSecurity,PrinciplesAndPracticeSixthEdition,WilliamStallings,Pearson
2. InformationSecurityPrinciplesandPracticeByMarkStamp,WileyIndiaEdition
3. Cryptography&NetworkSecurity,Forouzan,Mukhopadhyay,McGrawHill

ReferenceBooks:

1. CryptographyandNetworkSecurityAtulKahate,TMH
2. CryptographyandSecurity,CKShyamala,NHarini,TRPadmanabhan,Wiley-India
3. InformationSystemsSecurity,Godbole,Wiley-India
4. InformationSecurityPrinciplesandPractice,DevenShah,Wiley-India
5. SecurityinComputingbyPfleegerandPfleeger,PHI
6. BuildYourOwnSecurityLab:AFieldGuidefornetworktesting,MichaelGregg,WileyIndia

SubTitle:ENTERPRISE RESOURCEMANAGEMENT		
SubCode:CS08TOE09	No.ofCredits:3=3:0:0(L-T-P)	Nooflecturehours/ week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:36

COURSEOBJECTIVE:

1. **Todiscussthefundamentalconceptsanenterpriseanditsintegrationof majorfunctions**
2. **Todiscussthevarious technologies usedfor an ERP.**
3. **Todiscussimportanceofinformationinanorganization.**
4. **TodiscussMaterialresourcemanagement,forecastingandjobscheduling**

UNIT No	SyllabusContent	No ofHours
1	FunctionofBusinessOrganizations: Personnelmanagement,Financialmanagement, marketing management, Sales order Processing , Manufacturingmanagements , Human Resource Management etc , data and information ,Operationoffunctional areas.Integratedview of ERP	8
2	Technologies of ERP: knowledge based system , Decision support system ,Executive information system , Electronic commerce, , Databases system ,BusinessEngineering,BusinessprocessEngineering,Networking,3tierand2tier architecture.	7
3	Managementinformationsystem: MIS,data&information,levelofManagement , information requirement , objectives of information channels,informationstrategies	7
4	Informationandplanning: Resourcemanagementbenefitofmanagementplanningprocessobjectiveanditscharacteristic,policyandprocedures ,forecastinganditsvaries aspects.Scheduling,MRP,MRP-II	7
5	ERPimplementissues: softwaredevelopmentlifecycle,preEvaluationschemes, post implement issues, casestudies .	7

COURSE OUTCOMES: The students would have learnt

CO1: Basic concepts of an enterprise functions and its integration for ERP. CO2: Introduction of different technologies related to ERP.

CO3: Importance of an information for all levels of organization. CO4: Concepts of ERP for the manufacturer.

TextBooks:

1. EnterpriseresourceplanningbyAlixisLeonTMH
2. ManagementInformationSystembyJawardekar

ReferenceBooks:

1. KinematicsandSynthesisoflinkages-HartenbergandDenavit-McGrewHillBookCo
2. ERPbyGargandRavichandran
3. ManagementInformationSystems:Louden&Louden
4. InformationSystemandMIS:JKanter

SubTitle:WIRELESSENSORNETWORK		
SubCode:CS08TOE11	No.ofCredits:3=3:0:0(L-T-P)	Nooflecturehours/ week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:36

COURSEOBJECTIVE:

1. Understandthe fundamentalsofwirelessnetworks.
2. UnderstanddeploymentofsensorinWirelessSensorNetwork.
3. Understanddesign considerationsforwirelessnetworks.
4. UnderstandthedifferentroutingtechniquesofWirelessSensorNetwork.
5. UnderstandthedifferentchallengesofWirelessSensorNetwork.

UNIT No	SyllabusContent	No ofHours
1	Introduction: Wireless Sensor Network: Introduction, Architecture,Hardwareand Softwareusedin Wireless SensorNetwork.	8
2	Applications: Sensornetworkapplication:Motionmonitoring,Environmentalmonitoring,GenericArchitecture, Sensor networkEvolution.	7
3	Design And Deployment: Wireless Sensor Network : Design , Goals andIssues,Sensordeployment,Schedulingandcoverageissues,self-configurationand topology control, Querying, data collection and processing, Collaborativeinformationprocessingand groupconnectivity.	7
4	Routing: WirelessSensorRoutingProtocols: DataCentric,Hierarchical,Locationbased, Energyefficientrouting.	7
5	Challenges: SensorNetworkChallenges- Miniaturization,Powermanagement,Scalability,Remotemanagement, Usability,Standardizationandsecurity,System Challenges-TinyOS, NetworkSensor Platforms.	7

COURSEOUTCOMES:Thestudentswouldhavelearnt

CO1:Understandthebasicconceptsofwirelessnetwork.

CO2:UnderstandthedifferentapplicationsofWireless sensor network.CO3:UnderstandthedesigningconceptofWirelessSensorNetwork.

CO4:UnderstandthedifferentchallengesofWirelessSens

TextBooks:

1. Building Wireless Sensor Networks by Robert Faludi Binding: Paperback Publisher: O'Reilly Released: 2011
2. Wireless Sensor Networks by Zhao Feng, Guibas Leonidas Binding: Paperback Publisher: Elsevier India Released: 2004

ReferenceBooks:

1. Wireless Sensor Networks by

**C. S. Raghavendra, Krishna M. Sivalingam, Taieb Znati Binding: Paperback
Publisher: Springer / bsp Books Released: Rpt. 2010**

SubTitle:NETWORKSECURITYLAB	
SubCode:CS08PPE01	No.ofCredits:1.5=0:0:1.5(L-T-P)
ExamDuration:3hours	IA+ESE=30+20

LabOBJECTIVE:

- 1. Totrainmoreprofessional intheareaofNetwork Security**
- 2. Tosupportindevelopingvulnerabilityfree web applications**
- 3. Tosupportindustryin Cybersecurityresearch**

Unit No.	Content	TeachingHours
I, II,III,IV andV	<ul style="list-style-type: none"> • ImplementCaesarcipherencryption-decryption. • ImplementMonoalphabeticcipherencryption-decryption. • ImplementPlayfaircipherencryption-decryption. • ImplementPolyalphabeticcipherencryption-decryption. • ImplementHillcipherencryption-decryption. • ToimplementSimpleDESorAES. • ImplementDiffi-HellmenKeyexchangeMethod. • ImplementRSAencryption-decryptionalgorithm. • WriteaprogramtogenerateSHA-1hash. • Implementadigitalsignaturealgorithm. • Performvariousencryption-decryptiontechniqueswithcryptool. • StudyandusetheWiresharkforthevariousnetworkprotocols. 	18

LABOUTCOMES:Thestudentswouldhavelearnt

C01:DefinetheconceptsofInformationsecurityandtheiruse.

C02:Describetheprinciplesofsymmetricandasymmetriccryptography.C03:Understandandapplythevariousymmetrickeyalgorithms.

C04: Understand and apply the various asymmetric

TextBooks:

1. CryptographyAndNetworkSecurity,PrinciplesAndPracticeSixthEdition,WilliamStallings,Person
2. InformationSecurityPrinciplesandPracticeByMarkStamp,WileyIndiaEdition
3. Cryptography&NetworkSecurity,Forouzan,Mukhopadhyay,McGrawHill

ReferenceBooks:

1. Fundamentals of computer Algorithms, Horowitz, Sahani, Galgotia. 2nd Edition, 1998. ISBN 81-7515-257-5
2. Cryptography and Network Security Atul Kahate, TMH
3. Cryptography and Security, CK Shyamala, N Harini, TR Padmanabhan, Wiley-India
4. Information Systems Security, Godbole, Wiley-India
5. Information Security Principles and Practice, Deven Shah, Wiley-India
6. Security in Computing by Pfleeger and Pfleeger, PHI
7. Build Your Own Security Lab: A Field Guide for network testing, Michael Gregg, Wiley India

SubTitle:MICROPROCESSORANDINTERFACES		
SubCode:CS05TES05	No.ofCredits:3=3:0:0(L-T-P)	Nooflecturehours/ week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:36

COURSEOBJECTIVE:

1. **Todescribethebasicarchitectureof 8086.**
2. **Todiscussthe Instructionsetof8086.**
3. **EvaluatethedifferenttechniqueofinterfacingwithmemoryandIO devices.**
4. **Developknowledgeaboutinterfacingdevicesandperipheraldevices.**
5. **Todescribethe basicarchitectureof 80386andco-processor.**

UNIT No	SyllabusContent	No ofHours
1	MicroprocessorArchitecture-8086,Registerorganizationof8086,Signaldescriptionsof8086chip,PhysicalMemoryorganization,IntroductiontoMaximumand Minimummode operation, Processor 8088.	8
2	Instruction formats, Addressing modes, Instruction Set of 8086: Data transferinstructions, Arithmetic instructions,Logical instructions, Branch instructions,Shift and rotate instructions, String Manipulation instructions, Machine ControlInstruction, Flag Manipulation Instruction, Assembler Directive and OperatorsProgrammingwith an Assembler, Programmingexamples.	7
3	Introduction to Stack, Stack Structure of 8086, Interrupt, Interrupt and InterruptServiceRoutines,NonMaskableInterrupt,MaskableInterrupt.Subroutine,MACROS:DefiningaMACRO, PassingParameters to MACRO.	7
4	Memory Interfacing, Interfacing I/O Ports, Programmable Interval Timer 8253:ArchitectureandSignalDescription,Operatingmodes,ProgrammingandInterfacing 8253,DMA Controller 8257: Architecture and Signal Description,Keyboard/Display Controller 8279: Architecture and Signal Description, Mode ofOperation, Floppy Disk Controller 8272: Architecture and Signal Description,Commands.	7

5	MultimicroprocessorSystem:NumericProcessor8087,IOProcessor8089.8038 6:Features,ArchitectureandSignalDescription,RegisterOrganization, RealMode,Protected Mode,Virtual Mode, Paging,Segmentation.	7
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COURSE OUTCOMES: The students would have learnt

CO1: Learn about the basic architecture of 8086.

CO2: Develop a skill to do Assembly Language

Programming.
CO3: Learnto do interfacing with memory and IO devices.

CO4: Develop a understanding about the peripheral

Text Books:

1. Advanced Microprocessors and Peripherals – Architecture, Processing and Interfacing
:A.K.Ray, K.M.Bhurchandi
2. Microcomputer System 8086/8088 Family –
Architecture Programming and design: Y.Liu and G. A. Gibson: Prentice Hall
3. 80386 Microprocessor Handbook C.H.Pappas and W.H.Murray: Osborne McGraw Hill Reference Books:

ference Books:

1. Microprocessor Architecture Programming and Application: R.C.Gaonkar: Wiley Eastern.
2. Microprocessor 8086, 80386 & Pentium, Barry B. Brey

SubTitle:RelationalDataBaseManagementSystem		
SubCode:CS05TPC08	No.ofCredits:3=3:0:0(L-T-P)	Nooflecturehours/ week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:36

<p>COURSEOBJECTIVE:</p> <ol style="list-style-type: none"> <u>To describe asound introduction to the discipline of database management systems.</u> <u>To give a good formal foundation on the relational model of data and usage of Relational Algebra.</u> <u>To introduce the concepts of basic SQL as a universal Database language.</u>

UNIT No	Syllabus Content	No of Hours
1	Introduction: An overview of database management system, database system Vs file system, Database system concepts and architecture, data model schema and instances, data independence and database language and interfaces, Data definition language, DML, Overall Database Structure. Data Modeling using the Entity Relationship Model: ER model concepts, notation for ER diagram, mapping constraints, keys, Concepts of Super Key, candidate key, primary key, Generalization, aggregation, reduction of an ER diagrams to tables, extended ER model, relationships of higher degree.	8
2	Relational Data Model And Language: Relational data model concepts, integrity constraints: entity integrity, referential integrity, Keys constraints, Domain constraints, relational algebra, relational calculus, tuple and domain calculus, Introduction to SQL: Characteristics of SQL. Advantage of SQL. SQL data types and literals. Types of SQL commands. SQL operators and their procedure. Tables, views and indexes. Queries and sub queries. Aggregate functions. Insert, update and delete operations. Joins, Unions, Intersection, Minus, Cursors in SQL.	7
3	Database Design & Normalization: Functional dependencies, normal forms, first, second, third normal forms, BCNF, inclusion dependences, loss less join decompositions, normalization using FD, MVD, and JDs, alternative approaches to database design.	7

4	Transaction Processing Concepts: Transaction system, Testing of serializability, Serializability of schedules, conflict & view serializable schedule, recoverability, Recovery from transaction failures, log based recovery, checkpoints, deadlock handling.	7
5	Concurrency Control Techniques: Concurrency control, locking Techniques for concurrency control, Time stamping protocols for concurrency control, validation based protocol, multiple granularity, Multiversion schemes, Recovery with concurrent transaction.	7

COURSE OUTCOMES: The students would have learnt

CO1: Explain the features of database management systems and Relational database.

CO2: Design conceptual models of a database using ER modeling for real life applications and construct queries in Relational Algebra.

CO3: Create and populate a RDBMS for a real life application, with constraints and keys, using SQL.

CO4: Retrieve any type of information from a database by formulating comple

Text Books:

1. Date C.J., "An Introduction To Database System", Addison Wesley
2. Korth, Silbertz, Sudarshan, "Database Concepts", McGraw Hill
3. Elmasri, Navathe, "Fundamentals Of Database Systems", Addison Wesley
4. Leon & Leon, "Database Management System", Vikas Publishing House. R

Reference Books:

1. Bipin C. Desai, "An Introduction to Database Systems", Galgotia Publication
2. Majumdar & Bhattacharya, "Database Management System", TMH
3. Ramakrishnan, Gehrke, "Database Management System", McGraw Hill
4. Kroenke, "Database Processing: Fundamentals, Design and Implementation", Pearson Education.
5. Maheshwari Jain, "DBMS: Complete Practical Approach", Firewall Media, New Delhi

SubTitle:FORMALLANGUAGEANDAUTOMATATHEORY		
SubCode:CS05TPC09	No.ofCredits:=3:0:0(L-T-P)	Nooflecturehours/ week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:36

<p>COURSEOBJECTIVE:</p> <ol style="list-style-type: none"> <u>TolearnfundamentalsofRegularandContextFreeGrammarsandLang uages</u> <u>TounderstandtherelationbetweenRegular LanguageandFiniteAutomataandmachines.</u> <u>TolearnhowtodesignAutomata'sandmachinesasAcceptors,Verifiers andTranslators</u>
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UNIT No	SyllabusConten t	No ofHo urs
1	FiniteAutomata&RegularExpression: DeterministicandNon-deterministic Finite automata, Regular Expression, Two way finite automata,Finiteautomatawithoutoutput,Propertiesofregularset,Pumpinglemma,Closure properties.	8
2	Context Free Grammars (CFG): Introduction of CFG, Derivation trees,Simplification of normal forms, CNF, GNF, Regular Grammars, UnrestrictedGrammarsand Relations between Classesof languages.	7
3	PushDownAutomata: IntroductionofPDA,Definitionsrelationshipbetween PDA and Context Free Languages, properties of CGL's, DecisionAlgorithms.	7
4	TuringMachine: TheTuringmachinemodel,Computablelanguagesandfunctions,Modification ofTuringmachines,Church's Hypothesis	7
5	Recursive and Recursive Enumerable Languages: Properties of recursiveandrecursiveenumerablelanguagesUniversalTuringmachine,UndesirabilityPostcorrespondenceproblem,IntroductiontoRecursivefunctiontheory.	7

COURSE OUTCOMES: The students would have learnt

CO1: Understand, design, construct, analyze and interpret Regular languages, Expression and Grammars.

CO2: Design different types of Finite Automata and Machines as Acceptor, Verifier and Translator.

CO3: Understand, design, analyze and interpret Context Free languages, Expression and Grammars

CO4: Design different types of Pushdown Automata as Simple Parser.

CO5: Design different types of Turing Machines as Acceptor, Verifier, Translator

Text Books:

1. Introduction to Automata Theory Languages and Computation, Hopcroft and Ullman, Narosa.
2. Theory of Computer Science, Mishra and Chandrashekharan, PHI.

Reference Books:

1. Theory of Computer Science, Kohan, John Wiley.
2. Theory of Computer Science, Korral
3. Introduction to Automata Theory Languages and Computation, Hopcroft and Ullman, Addison Wesley
4. Introduction to Languages & Theory of Computation, Martin, TMH

SubTitle:PARALLELCOMPUTING		
SubCode:CS05TPC10	No.ofCredits:3=3:0:0(L-T-P)	Nooflectrehours/ week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:36

COURSEOBJECTIVE:

1. **To introduce parallel, distributed and cloud computing, the major concept, ideas and various hardware model of parallel and distributed system.**
2. **To study design the multiprocessor system by various interconnection network like static and dynamic etc.**
3. **To study various _____ technique for vector pipeline architecture design to achieve parallelism (concurrency)**
4. **To study about advanced and more power full processor technology**

UNIT No	Syllabus Content	No of Hours
1	IntroductionOfParallelism: Introduction-parallelism in Uniprocessor systems, Principles of Scalable Performance, architectural classification schemes, SISD, SIMD, MISD, MIMD architectures, multi processor and multi computer, UMA, NUMA, COMA, NORMA model Parallel algorithms: Various Sorting	8
2	Parallel Models & Interconnection Network: System Interconnect architecture - static, dynamic, multistage interconnection networks, design considerations throughputs, delay, blocking and non-blocking properties inter connected memory organization-C-Access, S-Access, C-S access.	7
3	Pipeline & Vector Processing: Principal of Pipelining- Overlapped parallelism, principal of Linear pipelining processor, General pipelining and reservation tables, arithmetic pipelining, Design of pipeline Instruction units, arithmetic pipelining design example, hazard detection and resolution, JOB sequencing and collision prevention, vector processing function organization of instructions in IBM 360/91.	7

4	Advanced Processor and Parallelism: Advanced processor technology – RISC&CISCcomputers,superscalararchitecture,principlesofmultithreading,multithreadedarchitecturesofMPsystems.Contextswitchingpolicies, shared variables, locks, semaphores, monitor, multitasking and Craymultiprocessor.	7
5	Parallel Programming Design Coding And Dubugging: CPU parallelism, GPUparallelism-program,Exploitingparallelisminprogrammed-multidimensionalarrays,directedacyclicgraphs,distanceanddirectionvectors,dataflowcomputerand dataflowgraphs. Parallelalgorithmstructure,analyzingparallelalgorithm.Elementaryparallelalgorithms,Programming:ParallelprogrammingwithSynchronousandAsynchronous,Various APIofMPS, PYTHON, CUDA, OpenCL.	7

COURSE OUTCOMES: The students would have learnt

C01: Spontaneously able to design the multiprocessor system with various hardware electronics circuit like CU, ALU, RAM etc.

C02: Design new interconnection network which connects the processors and other devices like input and output devices (I/O)

C03: Spontaneously try and invent a new type of pipeline processor architecture in which throughput can be as better as possible than all other.

C04: How do combine the techniques of parallelism to obtain a more powerful architecture as a outcome.

C05: Course outcome is a skill and ability to make parallel algorithm and program to enhance the speed of execution of process.

Text Books:

1. Computer Architecture & Parallel processing - Kai Hwang & Briggs. (MGH).
2. Advanced Computer Architecture with Parallel Programming", K. Hwang, MGH.
3. Quinn, Parallel computing - theory and practice, Tata McGraw Hill.
4. Sima and Fountain, Advanced Computer Architectures, Pearson Education
5. Ed. Afonso Ferreira and Jose' D. P. Rolin, Parallel Algorithms for irregular problems - State of the art, Kluwer Academic Publishers

Reference Books:

1. Parallel Computers: Arch. & Prog., Rajaraman & Siva Ram Murthy, PHI.
2. Parallel computing - Theory and practice - Michael J Quinn - McGraw Hill
3. Selim G. Akl, The Design and Analysis of Parallel Algorithms, PHI International.

SubTitle:SOFTWAREENGINEERING		
SubCode:CS05TPE01	No.ofCredits:3=3:0:0(L-T-P)	Nooflecturehours/ week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:36

COURSEOBJECTIVE:

1. To discuss the fundamental concepts of Software Engineering.
2. To discuss the Various Models of Software.
3. Acquire skills and knowledge to advance their career, including continually upgrading professional, communication, analytic, and technical skills.
4. To Learn the ability to work effectively as a team member and/or leader in an ever-changing professional environment
5. Learn to develop a small Software.

UNIT No	SyllabusContent	No ofHours
1	SoftwareEngineering: What is software, Evolution of Software, Characteristics of software, Types of Software, Applications of software, Layered Technology, Software Process Models: Linear Sequential model, Prototype model, RAD model, Incremental model, Spiral Model, Component Based Development Model.	8
2	ManagingSoftwareProject The Management Spectrum: People, Product, Process, Project. Software Process and Project Metrics – Measures and Metrics, Software Measurement-Size Oriented Metrics, Function Oriented Metrics, Metrics for Quality-Overview, Measuring Quality, DRE. Software Requirement Specification- Problem Analysis, Requirement Specification. Validation and verification, The Make/Buy Decision.	7
3	SystemDesign: Introduction, design principles, Problem partitioning, abstraction, top-down and bottom-up design, Low level Design: - Modularization, Structure Chart, Flowchart, Functional versus Object oriented approach, design specification, Design verification, monitoring and control.	7

4	<p>Coding: Top-down and bottom-up structured programming, information hiding, programming style, internal documentation, verification, monitoring and control.</p> <p>Software testing: Software Testing fundamentals, white box testing, Basis path testing, Cyclomatic Complexity, A strategic Issues, Unit testing, Integration testing, validation testing, System Testing.</p>	7
5	<p>Software Project Management: Cost estimation, project scheduling, Software configuration management, Quality assurance, Project Monitoring, Risk management.</p>	7

COURSE OUTCOMES: The students would have learnt

CO1: The Fundamentals of Software

Engineering
CO2: How to apply the software engineering lifecycle

CO3: Understand of different software architectural styles and Process framework.
CO4: Describe software measurement and software risks.

CO5: To Develop a Project.

Text Books:

1. Software Engg by Bharatbhushan Agrawal, Sumit Prakash Tayal.

Reference Books:

1. Software Engg by Pressmen
2. Software Engg by Pankaj Jalote

Softwar

SubTitle:RELATIONALDATABASEMANAGEMENTSYSTEMLAB	
SubCode:CS05PPC05	No.ofCredits:1.5=0:0:1.5(L-T-P)
ExamDuration:3hours	IA+ESE=30+20

LabOBJECTIVE:

1. **Toprovideasoundintroductiontothedisciplineofdatabase managementasasubjectinitso own right,rather thanasacompendiumof techniquesandproduct-specific tools.**
2. **Tofamiliarisetheparticipantwiththenuancesofdatabase environmentstowardsaninformation-orienteddata-processingoriented framework**
3. **Togiveagoodformalfoundationontherelationalmodelofdata**

Unit No.	Content	Teaching Hours
I, II,III,IV andV	<ul style="list-style-type: none"> • WritethequeriesforDataManipulationandDataDefinitionLanguage. • WriteSQLqueriesusinglogicaloperationsandoperators. • WriteSQLqueryusinggroupbyfunction. • WriteSQLqueriesforgroupfunctions. • WriteSQLqueriesforsubqueries,nestedqueries. • WriteprogrammebytheuseofPL/SQL. • WriteSQLqueriescreateviews. • WriteanSQLquerytoimplementJOINS. • Writeaqueryforextractingdatafrommorethanonetable. • WriteaquerytounderstandtheconceptsforROLLBACK,COMMIT &CHECKPOINTS. 	18

LABOUTCOMES: The students would have learnt

C01: Understand, appreciate and effectively explain the underlying concepts of database technologies

C02: Design and implement a database schema for a given problem-domain
Normalize a database

C03: Populate and query a database using SQL DML/DDL commands.

C04: Declare and enforce integrity constraints on a database using a state-of-the-art

DBMS C05: Programming PL/SQL including stored procedures, stored functions,

TextBooks:

1. AnIntroductiontoDatabaseSystem,DateCJ,AddisionWesley
2. DatabaseConcepts,Korth,Silbertz,Sudarshan,McGrawHill
3. FundamentalsofDatabaseSystems,Elmasri,Navathe,AddisionWesley
4. DatabaseManagementSystem,Leon&Leon,VikasPublishingHouse.

ReferenceBooks:

1. AnintroductiontoDatabaseSystems,BipinC.Desai,GalgotiaPublication
2. DatabaseManagementSystem,Majumdar&Bhattacharya,TMH
3. DatabaseManagementSystem,Ramakrishnan,Gehrke,McGrawHill
4. DatabaseProcessing:Fundamentals,DesignandImplementation,Kroenke,PearsonEducation.
5. DBMS:CompletePracticalApproach,MaheshwariJain,FirewallMedia,NewDelhi

SubTitle:PARALLEL COMPUTING LAB	
SubCode:CS05PPC06	No.ofCredits:1.5=0:0:1.5(L-T-P)
ExamDuration:3hours	IA+ESE=30+20

<p>LabOBJECTIVE:</p> <ol style="list-style-type: none"> <u>To study about various platform and libraries of parallel processing.</u> <u>To study about to create MPI program to accomplish a computational task</u> <u>To study about of API to carry out MPI</u> <u>To study about to know GPU importance in parallel programming</u>

Unit No.	Content	Teaching Hours
I, II, III, IV and V	<ul style="list-style-type: none"> Understanding the environment of OMP, MPI, CUDA Parallel programming environment and platform. Create and simulate multiple processes and threads on MP system. Simulate parallel program to synchronization and pooling of processes. Simulate the loop and function in parallelism manner. Simulate a parallel algorithm to perform some mathematical calculation and their execution time. Simulate the parallel sorting algorithm and their execution time. Simulate the parallel searching algorithm and their execution time. Simulate parallel some operation on array and list with their execution time. Optimization technique using shared memory module on MP system. Heterogeneous calculation using PYTHON (PTK), CUDA, and OPENCL toolkit. 	18

<p>LABOUR COMES: The students would have learnt</p> <p><u>CO1: Simulate and create process and threads</u></p> <p><u>CO2: Simulate parallel algorithm using various MPI</u></p> <p><u>CO3: Simulate parallel program for many computational task</u></p> <p><u>CO4: Simulate various memories to carry out</u></p>

TextBooks:

1. ProgrammingMassivelyParallelProcessors:AHands-onApproachPaperback-20December2012byDavidB.Kirk,Wen-meiW. Hwu
2. IntroductiontoParallelAlgorithms1stEditionbyJosephJaJa.

ReferenceBooks:

- 1.PythonParallelProgrammingCookbookPaperback-
August26,2015byGiancarloZaccone**

SubTitle:DESIGN ANDANALYSISOFALGORITHMS		
SubCode:CS06TPC11	No.ofCredits:3=3:0:0(L-T-P)	Nooflecturehours/ week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:36

<p>COURSEOBJECTIVE:</p> <ol style="list-style-type: none"> <u>To Analysis efficiency of algorithms on the basis of their time complexity and spacecomplexitybymathematicallyfoundation (asymptotic notation)</u> <u>To study about design and analysis of divide and conquer and greedy algorithm on thebasisoftheirattributesandalsodescribewhencouldbeusedthes etechniqueandwhichsituationfor which problem</u> <u>To know dynamic programming(DP) paradigm and algorithm for problems on thedifferentdata structurelike graph andarray</u>
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UNIT No	SyllabusContent	No ofHours
1	Algorithms Analysis: Space and Time Complexity, Asymptotic Notations,mathematicalfoundations:growthfunctions,complexityanalysis ofalgorithms,Recursivealgorithms,analysisofnon-recursiveandrecursivealgorithms,Recurrenceequationandtheirsolution. Mastermethod,recursivetreeand backward substitution method.	8
2	Divide&ConquerandGreedyMethod: Divideandconquer-FindingMaximaandMinimaBinarysearch,MergeSort,QuickSort,andselectionsort.Stassen'sMatrixmultiplicationGreedyMethod-introduction,Knapsackproblem, travelling sales person problem, Minimum Spanning trees- kruskal'salgorithm, prim's algorithm, Single source shortest path-Dijkstra's algorithm,Huffmancodes.	7
3	DynamicProgrammingandSearchTechniques: DynamicProgramming:Introduction,Matrixchainmultiplication,Singlesourceshortestpath-Bellman-Ford,allpairsshortestpath,optimalbinarysearchtree,0/1knapsackproblem, travelling sales person problem, longest common subsequenceSearchtechniques:Techniquesforbinarytrees,techniquesforgraphs-DESandBFS,connectedcomponents,Bi-connectedcomponents,andStrongly-connected components,Topological sorting. HeapDataStructure: MinandMaxHeap,FibonacciHeap,Binomialheap,AmortizedAnalysis, Heap sort.	7

SubTitle:JAVA		
SubCode:CS06TPC12	No.ofCredits:3=3:0:0(L-T-P)	Nooflecturehours/ week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:36

COURSEOBJECTIVE:

1. **To discuss the fundamental concepts of OOPs and Java**
2. **To discuss the Differences between C/C++ and Java.**
3. **Knowledge of Multithreading, Packages and Applet.**
4. **Use of Java on different Platform.**
5. **Learn to develop a small project using Java**

UNIT No	Syllabus Content	No of Hours
1	Java Fundamentals: Basic Concepts of Object-Oriented Programming, Java History, Java Features, How Java Differs from C and C++, Web Browsers, Java Environment, Java Program Structure, Java Tokens, Installing and Configuring Java, Implementing a Java Program, Java Virtual Machine, Command Line Arguments, Programming Style.	8
2	Constants, Variables and Data Types, Declaration of Variables, Giving values to variables, Scope of Variables, Symbolic Constants, Type Casting, Getting Values of Variables, Standard Default Values, Java Operators, Arithmetic Expression, Evaluation of Expressions, Precedence of Arithmetic Operators, Operator Precedence and Associativity, Mathematical Functions, Control Statements (if statement, switch statement and Conditional operator statement), Decision Making and Looping (while construct, do construct, for construct), Jumps in Loops.	7
3	Class, Objects and Methods: Introduction of Class, Defining a Class, Fields Declaration, Creating Objects, Accessing Class Members, Constructors, Methods Overloading, Static Members, Nesting of Methods, Inheritance: Extending a Class, Overriding Methods, Final Variables and Methods, Final Classes, Abstract Methods and Classes, Visibility Control Introduction of Array: One Dimensional Array, Creating an array, Two-Dimensional arrays, Strings, Wrapper Classes. Interfaces: Defining Interfaces, Extending Interfaces, Implementing Interfaces, Accessing Interface Variables, Packages: Java API Packages, Using System Packages, Naming Conventions, Creating Packages, Accessing a Package, Using a Package, Adding a Class to a Package, Hiding Classes, Static Import.	7

4	<p>Introduction to Multithreaded Programming: Difference between Multithreading and Multitasking, Creating threads, Extending the thread class, Stopping and Blocking a thread, Life Cycle of a thread, Using thread Methods, Thread Exception, Thread Priority, Synchronization, Implementing the Runnable Interface, Inter-thread Communication.</p> <p>Managing Errors and Exceptions: Types of Errors, Exceptions, Syntax of</p>	7
5	<p>Introduction of Applet Programming, How Applets Differ from Applications, Preparing to Write Applets, Building Applet Code, Applet Life Cycle, Creating an Executable Applet, Designing a Web Page, Applet Tag, Adding Applet to HTML file, Running the Applet, Passing Parameters to Applets, Aligning the Display, Displaying Numeric values, Getting input from the user, Event handling, Introduction of Graphics Programming, Introduction to AWT package,</p> <p>Managing Input/Output Files in Java: Concept of Streams, Stream Classes, Byte Stream Classes, Character Stream Classes, Other useful I/O classes, Using the file class, Input/Output exceptions.</p>	7

<p>COURSE OUTCOMES: The students would have learnt</p> <p><u>CO1: Understanding of basic concept of Java Programming</u></p> <p><u>CO2: Knowledge of the structure of Java.</u></p> <p><u>CO3: The Concept of Exception Handling, Package and Applet</u></p> <p><u>CO4: To use the Java programming language for various programming technologies (understanding)</u></p>
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Text Books:

1. E. Balagurusamy, Programming with Java A Primer, Fourth Edition, McGraw Hill, 2010.

Reference Books:

1. H. Schildt, Java TM 2: The Complete Reference, Fourth Edition, Tata McGraw Hill, 2001.
2. K.A. Mughal and R.W. Rasmussen, A Programmer's Guide to Java TM SCJP
3. Certification A Comprehensive Primer, Third Edition, Addison Wesley, 2008.

SubTitle:COMPUTERGRAPHICS		
SubCode:CS06TPC13	No.ofCredits:3=3:0:0(L-T-P)	Nooflecturehours/ week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:36

<p>COURSEOBJECTIVE:</p> <ol style="list-style-type: none"> <u>To introducetheuse ofthe componentsofagraphicssystemandbecomefamiliarwithbuildinga pproachof graphicssystemcomponentsandalgorithmsrelatedwiththem.</u> <u>Tolearn thebasic principlesof3-dimensional computergraphics.</u> <u>Provideanunderstandingof how toscanconvertthe basicgeometricalprimitives,howtotransform theshapes to fit them as perthepicturedefinition.</u> <u>Provideanunderstandingofmappingfromaworldco-ordinatestodevicecoordinates clipping and projections</u>

UNIT No	SyllabusContent	No ofHours
1	LineGenerationPoints,lines,PlainesVector,pixelsandframebuffers,Vectora ndcharactergeneration.GraphicsPrimitives,Displaydevices,Primitiveoper ation,Display-filestructure, Displaycontrol text.	8
2	Polygons: Polygons representation, Entering polygons, Filling Polygons.Transformation: Matricesof2DTransformation,transformationroutinesDisplayprocedures.	7
3	Segments: Segmentstable,CreatingDeletingandrenamingasegmentVisibili ty,Imagetransformation. WindowingandClipping: Viewingtransforming,Clipping,Generalizedclip ping,multiple windowing.	7
4	Three Dimensions: 3-D Geometry Primitives, Transformation, Projection,Clipping, Hidden line and SurfacesBack- faceRemovalAlgorithms,Hiddenlinemethods.	7
5	RenderingandIllumination: Introductionto curvegeneration. Bezier.Hermitand B- splinealgorithms and theircomparisons.	7

COURSE OUTCOMES: The students would have learnt

C01: To list the basic concepts used in computer graphics.

C02: To implement various algorithms to scan, convert the basic geometrical primitives, transformations, Area filling, clipping.

C03: To describe the importance of viewing and projections.

C04: To define the fundamentals of animation, virtual reality and its related technologies.

C05: To understand a typical graphics pipeline

C06: To design an application with the principles of virtual reality

Text Books:

1. Hearn Baker, "Computer Graphics", PHI.
2. Rogers, "Procedural Elements of Computer Graphics", McGraw-Hill.
3. Newman & Sproule, "Principles of Interactive Computer Graphics", MGH 1987.

Reference Books:

1. Harringtons S., "Computer Graphics, A Programming Approach Second Edition MGH 1987.
2. Rogers & Adams, "Mathematical Elements of Computers Graphics", Second Edition MGH.
3. Henry Baper, "Computer Graphics"

SubTitle: DIGITAL IMAGE PROCESSING		
SubCode: CS06TPE05	No. of Credits: 3=3:0:0(L-T-P)	No of lecture hours/ week: 03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours: 36

<p>COURSE OBJECTIVE:</p> <ol style="list-style-type: none"> <u>To discuss the fundamental concepts of digital image processing</u> <u>To discuss the various image transform with respect to basic functions, properties and application.</u> <u>To discuss image enhancement technique in spatial and frequency domain.</u> <u>To discuss image segmentation and restoration technique in spatial and frequency domain.</u>

UNIT No	Syllabus Content	No of Hours
1	Digital Image Fundamentals: Background, digital image representation, examples of field that use DIP, fundamental steps in digital image processing, Simple image model, basic relationships between pixels: neighborhood of a pixel, Connectivity, Basic transformations: translational, rotational, scaling. Color models and transformations, Pseudocolor Image Processing.	8
2	Image Transforms: Introduction to 2D Transforms: Fourier Transform and Properties, DCT and Properties, Hadamard Transform and Properties, WHT and properties Image Compression: Fundamentals, image compression models, elements of information theory, Image Compression: lossy and non lossy compression, image compression standards.	7
3	Image Enhancement Spatial Domain: Background, Basic gray level transformations, histogram: Computation histogram, histogram specification, histogram equalization, enhancement using arithmetic/logic operations, basics of spatial filtering, smoothing sharpening spatial filters, combining spatial enhancement methods. Edge Detection Methods: Prewitt, Sobel and Robert Frequency Domain: Background, introduction to the frequency domain, smoothing and sharpening frequency domain filters, homomorphic filtering, generation of spatial masks from frequency domain specifications.	7
4	Image Segmentation: Detection of discontinuities, edge linking & boundary detection, thresholding, Region based segmentation, morphological watershed, the use of motion in segmentation	7

5	Image Restoration : Degradation model, Noise models, restoration in the presence of noise only (Spatial and frequency domain filters), Inverse filtering, LMS filtering, Wiener filter, constrained least square restoration, interactive restoration, restoration in the spatial domain	7
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COURSE OUTCOMES: The students would have learnt

CO1: Understanding of basic image processing techniques. CO2: Image analysis using 2-D image transforms

CO2: Image enhancement technique in spatial and frequency domain

CO3: Image processing applications such as compression, segmentation and restoration. CO4: Learn to apply different image processing te

Text Books:

1. Digital Image Processing, RCGonzalez & RE Woods, Pearson Education, 3 edition.
2. Digital Image Processing and Computer Vision, Milan Sonka, Cengage learning, First edition.

Reference Books:

1. Digital Image Processing, S.Jayaraman, S.Esakkirajan, T.Veerakumar, Tata Mcgraw Hill, 2009.
2. Fundamentals of Digital Image processing, AKJain, PHI/Pearson Education, 1989.

SubTitle:ARTIFICIALINTELLIGENCE		
SubCode:CS06TPE07	No.ofCredits:3=3:0:0(L-T-P)	Nooflecturehours/ week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:36

COURSEOBJECTIVE:

- 1. To create appreciation and understanding of both the achievements of AI and the theory underlying those achievements.**
- 2. To introduce the concepts of a Rational Intelligent Agent and the different types of Agents that can be designed to solve problems**
- 3. To review the different stages of development of the AI field from human like behavior to Rational Agents**

UNIT No	Syllabus Content	No of Hours
1	Introduction of Artificial Intelligence(AI),Difference between Intelligence and Artificial Intelligence, Definitions of AI, Strong AI and Weak AI, Application areas of AI, Comparison of Conventional and AI Computing, History of AI, Turing Test, Branches of AI, Intelligent Agents, State Space Representation, Production System, Heuristic Search, Search Methods (Uninformed Search and Informed Search), Breadth First Search, Depth First Search, Difference between Breadth First Search and Depth First Search, Hill Climbing, Best First Search.	8
2	Role of Knowledge Representation in AI, Types of Knowledge, Properties of Knowledge Representation System, Categories of Knowledge Representation Scheme, First Order Predicate Calculus, Well Formed Formula in Predicate Logic, Conversion to Clausal Form, Resolution in Predicate Logic, Semantic Nets, Properties of Semantic Nets, Frames, Scripts, Advantages and Disadvantages of Scripts.	7
3	Introduction of Expert System, Comparison between Human Expert and Expert System, Comparison between Expert System and Software System, Difference between Knowledgebase and Database, Basic Components of an Expert System, Characteristics of Expert System, Life Cycle Development of Expert System, Advantages of Expert System, Limitation of Expert System, Expert System Tools, Existing Expert Systems (DENDRAL and MYCIN).	7

4	Introduction to LISP : Syntax and Numeric Functions, Working with GNUCLISP, Basic Data Objects in GNUCLISP, Basic List Manipulation Functions in GNUCLISP (setq, car, cdr, cons, list, append, last, member, reverse), User Defined Functions in GNU CLISP, Predicates (atom, equal, evenp, oddp, zerop, >=, <=, listp, null) and Conditionals (cond and dif) in GNUCLISP, Logical Functions (not, or, and) in GNUCLISP, Input /Output and Local Variables (read, print, princ, terpri, format, let, prog) in GNUCLISP, Recursion and Iteration (do) in GNU CLISP, Arrays in GNUCLISP	7
5	Introduction to PROLOG, Term, Ground Term, Function, Predicate, Features of PROLOG, Program Clause, Unit Clause, Logic Program, Goal Clause, Empty Clause, Simple Query, Conjunctive Query, Structure of PROLOG Program, Working with SWI-Prolog General Syntax of PROLOG, Execution of a Query in Logic Program (Ground Query and Non-Ground Query), Law of Universal Modus Ponens, Ground Reduction, PROLOG Control Strategy, Search Tree and Proof Tree, Relational and Arithmetic Operators, Recursion in PROLOG, Lists manipulation in PROLOG, Iterative programming in PROLOG.	7

COURSE OUTCOMES: The students would have learnt	
Text Books:	
CO1:	Demonstrate knowledge of the building blocks of AI as presented in terms of intelligent agents
1. E. Borra, K. K. Srinivasan, Social Intelligence, Forty Sixth Edition, Tata McGraw Hill, 2007.	
CO2:	Analyze and formalize the problem as a state space, graph, design heuristic rules and select among different search or game based techniques to solve them.
1. W. Patterson, Introduction to Artificial Intelligence and Expert Systems, Fourth Edition, Prentice Hall of India, 2001.	
CO3:	Develop intelligent algorithms for constraints satisfaction problems and also design intelligent systems for Game Playing
1. S. Kausnik, Logic and Prolog Programming, New Age International Limited, 2006.	
CO4:	Attain the capability to represent various real life problem domains using logic based techniques and use this to perform inference or planning.
CO5:	Formulate and solve problems with uncertain information using Bayesian

Sub Title: MANAGEMENT INFORMATION SYSTEM		
Sub Code: CS06TOE01	No. of Credits: 3=3:0:0 (L-T-P)	No of lecture hours/ week: 03
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours: 36

COURSE OBJECTIVE:

1. To describe the role of information technology and decision support systems in business and record the current issues with those of the firm to solve business problems.
2. To introduce the fundamental principles of computer-based information systems analysis and design and develop an understanding of the principles and techniques used.
3. To enable students understand the various knowledge representation methods and different expert system structures as strategic weapon to counter the threat to business and make business more competitive.
4. To enable the student to use information to assess the impact of the In

UNIT No	Syllabus Content	No of Hours
1	Information System: Introduction of Information System, Fundamentals of Information System, Strategic Role of Information in Organization and Management, Three dimensions of Information System, Information System and Organization, Business Process Re-Engineering, Traditional and Computer based information system.	8
2	Decision Support System: Integration of Information, Types of Decision making in Organization, Decision Making Process, Models and Decision Support, Decision in business Areas, Strategic Analysis	7
3	Information System Planning: Types of Controlling Information System, Development of MIS Methodology and Tools/Techniques for Systematic Identification, Evaluation, Modification of MIS, Information System Success and Failure Implementation	7
4	Information System for Business Operations: Cross Functional Information System, A study of major Financial, Production, Human Resource Information System and Marketing Information System.	7

5	Security and Auditing of Information System: Management of Information System and End-User Computing, Security and Ethical issues of Information System, Major issues in Information System, Auditing of Information System.	7
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COURSE OUTCOMES: The students would have learnt

CO1: Relate the basic concepts and technologies used in the field of management information systems;

CO2: Compare the processes of developing and implementing information

systems. CO3: Outline the role of the ethical, social, and security issues of information systems.

CO4: Translate the role of information systems in organizations, the strategic management processes with the implications for the management

Text Books:

1. Management Information System: A Contemporary Perspective, Kenneth C. Laudon and Jane Price Loudon, Maxwell Macmillan International Editions.

Reference Books:

1. Management Information System: Solving Business Problems with Information Technology, Gerald V. Post and David L. Anderson, Tata McGraw-Hill Edition

Management Information System: Managing Information Technology in the Internetworked Enterprise, James A. O'Brien Tata McGraw-Hill Edition, Fourth Edition

SubTitle:DESIGNANDANALYSISOFALGORITHMSLAB	
SubCode:CS06PPC07	No.ofCredits:1.5=0:0:1.5(L-T-P)
ExamDuration:3hours	IA+ESE=30+20

LabOBJECTIVE:

1. Understandthe recursivetype algorithmwiththeirdatastructure
2. Understandthedivideandconquer(withrecursivefunction)andgreedyalgorithmlikemergesort, quick sort and single sourceshortest path
3. Understandthedynamicprogrammingparadigmmandanalysisithesingle sourceandallpairshortest path algorithm
4. Understandthebranchandboundtechnique ,heapandFibonacci

Unit No.	Content	TeachingHours
I, II,III,IV andV	<ul style="list-style-type: none"> • SimulatetheStackdatastructure(recursion)anddotheposteriorianalysis. • SimulateBFS,DFSonGraphandestimatetherunningtime. • SimulatePrim'sandKruskal'sAlgorithmmanddotheposteriorianalysis • SimulateDijkstra'salgorithmmanddotheposteriorianalysis • Simulateallpairshortestpathproblemanddotheposteriorianalysis • SimulateBellmanalgorithmmanddotheposteriorianalysis • SimulateofHuffmanTreeanddotheposteriorianalysis • Simulate ofcheckwhetheragivengraphisconnectedornotusingDFSmethodanddotheposteriorianalysis • SimulateofHeapTreeandheapsortanddotheposteriorianalysis • SimulateofNQueen'sproblemusingBackTrackinganddotheposteriorianalysis • Simulate0/1KnapsackproblemusingDynamicProgramminganddotheposteriorianalysis • SimulateTSPproblemusingDynamicProgramminganddotheposteriorianalysis • SimulatefractionalKnapsackproblemanddotheposteriorianalysis • Simulate tofindasubsetsum ofagiven setofintegernumberanddotheposteriorianalysis • Simulateto detect the circle in graph by using DFS algorithm anddotheposteriorianalysis 	18

LABOUTCOMES:Thestudentwouldhavelearnt

C01:Implementrecursivealgorithmwitharrayandstackdatastructure

C02:Varioustoolstosimulatedivideandconqueralgorithmandgreedyusinggraphandlinklist.C03:Dynamicprogrammingtooptimizationtypeanddecisiontypeproblems.

C04:Implementsome problemslike data compressionalgorithmand sorting algorithm using tree,arrayetc.

C05:SimulateandoptimizesomeNPclassproblemlikeSAT,cliqueandTSPetc.

TextBooks:

1. IntroductiontoAlgorithm,ThomasH.Cormen,CharlesE.Leiserson,RonaldRivest,CliffordStein,PublisherPHI,ISBN 81-203-2141-3
2. Algorithms,SanjayDasgupta,ChristosH.PapadimitriouandUmeshV.Vazirani,TataMcGraw-Hill,2008.
3. PythonAlgorithmsMasteringBasicAlgorithmsinthePythonLanguagebyMagnusLieHetland.
4. AlgorithmDesign,JonKleinbergandÉvaTardos,Pearson,2005.

ReferenceBooks:

1. FundamentalsofcomputerAlgorithms,Horowitz,Sahani,Galgotia.2ndEdition,1998.ISBN81-7515-257-5
2. DataStructuresandAlgorithmsUsingPythonRanceD.Necaise

SubTitle:JAVALAB	
SubCode:CS06PPC08	No.ofCredits:1.5=0:0:1.5(L-T-P)
ExamDuration:3hours	IA+ESE=30+20

LabOBJECTIVE:

1. **To provide the knowledge of Basics of Java.**
2. **To learn the Concept of package and Applet in Java.**
3. **To develop an awareness of modern programming language.**
4. **Provide practical Knowledge and Skills for developing a program with java.**

Unit No.	Content	Teaching Hours
I, II, III, IV and V	<ul style="list-style-type: none"> • Write a program to find a factorial of a given number. • Write a program to show all relational and Logical operators • Write a program using Constructors • Write any program using the concept of method overloading. • Write a program to show the concept of Inheritance. • Write a program to show 10 string operations • Write a program using packages • Write a program to show the concept of Synchronization in Multithreading. • Write a program to show exception handling in java • Write a program to show human face using Applets 	18

LABOUR COMES: The students would have learnt

CO1: The basic Concept of JAVA.

CO2: Use an integrated development environment to write, compile, run, and test simple object-oriented Java programs.

CO3: About Concept of Multithreading, Packages and Applet.

CO4: Read and make elementary modifications to Java programs that solve real world problems CO5: To develop small Software using JA

Text Books:

1. Programming with Java A Primer, E. Balagurusamy, Fourth Edition, McGraw Hill, 2010.

ReferenceBooks:

1. Java™2: The Complete Reference, H. Schildt, Fourth Edition, Tata McGraw Hill, 2001.
2. A Programmer's Guide to Java™ SCJP Certification A Comprehensive Primer, K.A. Mughal and R.W. Rasmussen, Third Edition, Addison Wesley, 2008.

**SCHEME FOR
EXAMINATION B.TECH (FOUR YEAR)
DEGREE
COURSE COMPUTER SCIENCE AND ENGINEERING
SCHOOL OF STUDIES IN ENGINEERING &
TECHNOLOGY GURUGHASIDAS VISHWA VIDYALAYA
SECOND YEAR, SEMESTER-III & IV
W.E.F. SESSION 2021-22**

Branch:-Computer Science & Engg.			Year:II			Sem:-III			Credits
S.No	Codeno.	Subject	Periods			Evaluation Scheme			
			L	T	P	IA	ESE	Total	
1	CS203TES06	Digital logic & Design	3	1	0	30	70	100	4
2	CS203TPC01	IT workshop (C++ / python)	3	1	0	30	70	100	4
3	CS203TPC02	Computer Network	3	1	0	30	70	100	4
4	CS203TPC03	Computer Organization & Architecture	3	1	0	30	70	100	4
5	CS203TBS05	Mathematics III (Numerical Methods)	3	1	0	30	70	100	4
PRACTICAL									
1	CS203PPC01	IT workshop (C++ / python) Lab	0	0	3	30	20	50	1.5
2	CS203PPC02	Computer Network Lab	0	0	3	30	20	50	1.5
3	CS203PES06	Digital Logic & Design Lab	0	0	3	30	20	50	1.5
Total									24.5

Branch:-Computer Science & Engg.			Year:II			Sem:-IV			Credits
S.No	Codeno.	Subject	Periods			Evaluation Scheme			
			L	T	P	IA	ESE	Total	
1	CS204TPC04	Discrete Mathematics	3	1	0	30	70	100	4
2	CS204TES07	Electronic Device & Circuits	3	0	0	30	70	100	3
3	CS204TPC05	Operating System	3	1	0	30	70	100	4
4	CS204TPC06	Data Structure & Algorithms	3	1	0	30	70	100	4

5	CS204THS02	MANAGEMENT I- MANAGEMENTPROC ESSAND ORGANIZATIONALB EHAVIOUR	3	0	0	30	70	100	3
PRACTICAL									
1	CS204PPC03	Operating SystemLab	0	0	3	30	20	50	1.5
2	CS204PPC04	Data Structure &AlgorithmsLa b	0	0	3	30	20	50	1.5

3	CS204PES07	Electronic Device &CircuitsLab	0	0	3	30	20	50	1.5
								Total	22.5

SubTitle:COMPUTERORGANIZATION&ARCHITECTURE		
SubCode:CS203TPC03	No.ofCredits:4=3:1: 0(L-T-P)	Nooflecturehours/ week:04
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:45

<p>COURSEOBJECTIVE:</p> <ol style="list-style-type: none"> 1. <u>Conceptualize the basics of organizational and architectural issues of a digitalcomputer.</u> 2. <u>Analyze processor performance improvement using instruction level parallelism.Learnthefunction ofeachelement ofamemory hierarchy.</u> 3. <u>Studyvariousdatatransfertechiniquesindigitalcomputer.</u> 4. <u>Articulate design issues in the development of processor or</u>

UNIT No	SyllabusContent	No ofHours
1	<p>Basic of Computer Organization & Architecture: Introduction, ComputerOrganizationvs.Computerarchitecture,VonNeumannArchitecture vs.HarvardArchitecture.</p> <p>Input & Output Organization: Introduction, Simple Bus Architecture, TypesofBuses,I/OCommunicationMethodologies:ProgrammedI/O(Polling), Interrupt-drivenI/O&DirectMemoryAccess(DMA),I/Ochannel&I/OProcessor,AccessingI/Odevice:MemoryMappedI/O,IsolatedorI/OMapped.</p>	10
2	<p>ComputerArithmetic:Introduction,Addition&Subtraction:Addition&SubtractionwithSigned-MagnitudeData,HardwareImplementation&Algorithm,Addition&SubtractionwithSigned-2'sComplementData,MultiplicationAlgorithm:HardwareImplementationfor Signed-MagnitudeData, Hardware Algorithm, Booth Multiplication Algorithm, Array Multiplier,Division Algorithms: Hardware Implementation for Signed-Magnitude Data &Algorithm, Carry Look Ahead Adder.</p>	10
3	<p>Memory Organization: Introduction, Types of Memory, Memory Hierarchy,MainMemory,CacheMemory, VirtualMemory,AssociativeMemory.</p> <p>Processor Organization: Introduction, Control Unit: Hardwired Control Unit,MicroprogrammedControlUnit,InstructionSetComputer:ReducedInstructionSetComputer(RISC)vs.Complex Instruction SetComputer(CISC).</p>	10

4	Pipelining: Introduction,ConceptofInstructionPipeline,DesignProblemswithPipeline:StructuralHazard,DataHazard&ControlHazard,ExtensioninPipelineDesigned:SuperPipelining,SuperscalarProcessor,VeryLongInstructionWidth (VLIW)Architecture.	8
5	MultiprocessorSystem: Introduction,SharedMemoryMultiprocessor,Distributed Memory Multiprocessor, Flynn's Classification: Single InstructionSingleData (SISD),SingleInstructionMultipleData (SIMD),Multiple Instruction Single Data (MISD), Multiple Instruction Multiple Data (MIMD),CacheCoherence,MessagePassingModel,ClusterComputing,DistributedComputing.	7

COURSEOUTCOMES:Thestudentswouldhavelearnt

CO1:Understandthecomputerarchitectureconcepts.

CO2:Understandandapplydifferentnumbersystemsandcodes.

CO3: Understand memory hierarchy and its impact on computer cost/performance.CO4:Designapipelineforconsistentexecutionof instructionswithminimumhazards.CO5:Understand theconcepts

TextBooks:

1. Computer SystemArchitecture,M.MorrisMano,Pearson EducationIndia.
2. Computer Organization& Architecture, W. Stalling, Pearson EducationIndia.

ReferenceBooks:

1. Computer Architecture& Organization, J. P. Hayes, McGraw-HillIndia.
2. Computer SystemOrganization,NareshJotwani,Mc GrawHill,India.
3. ComputerSystem Architecture, P. V. S. Rao, PHIIndia.
4. AdvancedComputerArchitecture,RajivChopra,S.ChandIndia.
5. ComputerOrganization&Architecture,LalitK.Arora,AnjaliArora,S.K.Kataria&Sons,India.
6. ComputerFundamentalsArchitecture&Organization,BRam,SanjayKumar,NewAgeInternational,India.

SubTitle: DIGITAL LOGIC & DESIGN		
SubCode: CS203TES06	No. of Credits: 4=3:1: 0(L-T-P)	No of lecture hours/ week: 04
Exam Duration: 3 hours	IA+ESE=30+70	Total no of contact hours: 45

<p>COURSE OBJECTIVE:</p> <ol style="list-style-type: none"> 1. 2. <u>The concept of various components.</u> 3. <u>The concepts that underpin the disciplines of analog and digital</u> 4. <u>electronic logic circuits. Various Number system and Boolean</u> 5. <u>algebra.</u> <p><u>Design and implementation of combinational circuits</u> <u>Design and implementation of Seq</u></p>

UNIT No	Syllabus Content	No of Hours
1	<p>Binary System: Binary Number, Number Base conversion, Octal and Hexadecimal Numbers Complements, Binary Codes Binary Storage and Registers, Binary Logic, Integrated Circuits.</p> <p>Boolean Algebra and Logic Gates: Basic Definitions Axiomatic Definition of Boolean algebra .Basic Theorems and Properties of Boolean algebra Boolean Functions Canonical and Standard Forms .Other Logic Operations Digital Logic Gates. IC Digital Logic Families. NAND, NOR, EOR gates.</p>	10
2	<p>Boolean Functions Combination Logic: The map method Two and Three Variable Maps, Four Variable Map Product of sums Simplification, NAND and NOR implementation, Don't Care Conditions, The Tabulation Method</p> <p>Combinational Logic: Introduction, Design procedure Adders, Subtractors</p> <p>.Code Conversion, Analysis Equivalence Functions</p>	10
3	<p>Combinational Logic with MSI and LSI: Introduction Binary Parallel Adder, Decimal, Adder, Magnitude Comparator, Decoders, Multiplexers, Read-Only Memory (ROM), Programmable Logic Array (PLA) Concluding Remarks</p>	10
4	<p>SEQUENTIAL LOGIC: Introduction, Flip -Flops, triggering of Flips -Flops, Analysis of Clocked Sequential Circuits, State Reduction and Assignment. Flip -Flop Excitation Tables Design Procedure. Design of Counters, Design with State Equations.</p>	8
5	<p>Registers, Counters, Memory Unit & FPGA Programming: Introduction Register s, shift Registers. Ripple Counters, Synchronous Counters. Timing Sequences, The Memory Unit Examples of Random Access Memories, FPGA: Introduction, FPGA Programming</p>	7

COURSE OUTCOMES: The students would have learnt

C01: Understand the concepts of various component to design stable analog circuits. C02: Represent numbers and perform arithmetic operations.

C03: Minimize the Boolean expression using Boolean algebra and design it using logic gates. C04: Analyze and design combinational circuit.

C05: Design and develop sequential circuits.

Text Books:

1. Digital Logic & Computer Design PH1M Mano
2. Switching Circuit & Finite automata – ZVI Kohavi (TMH)
3. Fletcher W.I.: An engineering approach to Digital design PH1

Reference Books:

1. Switching and Finite Automata Theory by Zvi. Kohavi, Tata McGraw Hill.
2. Switching and Logic Design, C.V.S. Rao, Pearson Education
3. Digital Principles and Design – Donald D. Givone, Tata McGraw Hill, Edition.
4. Fundamentals of Digital Logic & Micro Computer Design, 5TH Edition, M. Rafiquzzaman John Wiley.

SubTitle:ITWORKSHOP(C++/PYTHON)		
SubCode:CS203TPC01	No.ofCredits:4=3:1: 0(L-T-P)	Nooflecturehours/ week:04
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:45

<p>COURSEOBJECTIVE:</p> <ol style="list-style-type: none"> 1. 2. <u>To know different programming paradigms.</u> 3. <u>To study and understand the object oriented programming concepts and methodology. To implement object oriented programming concepts in C++.</u> 4. <u>To direct and handling file streaming</u> 5. <u>To learn introductory Python environment and program structure</u>

UNIT No	Syllabus Content	No of Hours
1	Abstract Data Types And Programming Environment: TC++ Environment variables, Compilation and Linking steps, functions and parameters Object identity, concept of Classes. arrays, control statements. C++ in different platforms DOS BOX etc.	10
2	Object-Oriented Programming: Programming using class and objects, functions, return types, pointer, concepts of encapsulation, default, parametric, hybrid and copy constructors, destructors, memory management operators	10
3	Advance Concepts of Object-Oriented Programming: Polymorphism operator and function overloading, Inheritance in object oriented design, Brief concepts of Aggregation, Generalization, Specification. Design concepts Flowchart, Decision table, virtual class and virtual functions	10
4	File Handling: Input & output Streams and object handling in file, Ios family class, text & binary files, Basic character operations, file opening modes ios flags, seekg(), tell(), seekp(), tellp(), command line arguments Streaming and File input and output handling	8
5	Introduction to Python: Introduction of Python Programming: python programming environment, research areas and applications of python, Data representation, introductory level programming in python.	7

COURSE OUTCOMES: The students would have learnt

C01: Programming environment and basic elements

C02: Key features of the object-oriented programming language. C03: Advanced concepts of object-oriented concepts.

C04: Streaming concepts for file handling

C05: Introduction of Python programming environment

Text Books:

1. Object Oriented Programming with C++ by E. Balaguruswami, TMH 2019
2. Object Oriented Programming with C++ by Robert Lafore, Waite Group 2016
3. Machine Learning Tom M. Michell, McGraw Hill, Indian addition
4. Applied Machine Learning by M. Gopal, McGraw Hill Education Re

ference Books:

1. Introduction to python by Bill Lubovien by O'Reilly
2. Object Oriented Programming with C++ by M.P. Bhave, S.A. Patekar, Pearson Education
3. The Complete reference by Herbit Schildt, McGraw Hill
4. C++ premier by F.B. Lippman, Addison Wesley
5. The C++ Programming Language, Bajarstroustrup, Addison Wesley

SubTitle:COMPUTERNETWORK		
SubCode:CS203TPC02	No.ofCredits:4=3:1: 0(L-T-P)	Nooflecturehours/ week:04
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:45

COURSE OBJECTIVE:	UNIT No.	SyllabusContent	No of hours
Discuss the basic taxonomy and terminology of the computer networking. Discuss the functionality of different layers of OSI Model.	1	Introduction: Discuss the different protocols of TCP/IP protocol suite.	10
Discuss the process of IP addressing and working of routing protocols.	2	Data communications: Components, Data representation, Direction of data flow (simplex, half duplex, full duplex)	10
Discuss the different challenges of Internet networking. Congestion control and Quality of services	3	Networks: Distributed processing, Network criteria, Physical structure (type of connection, topology), categories of network (LAN, MAN, WAN); Internet: brief history, internet today, Protocols and standard	
		Referencemodels: OSI referencemodel, TCP/IP referencemodel, their comparative study. PhysicalLayer: Transmission technology.	
	2	DataLinkLayer: Types of errors, Error detection & correction methods, Framing (character and bit stuffing), Flow control, Protocols: Stop & wait ARQ, Go-Back-NARQ, Selective repeat ARQ Medium access sub layer: Point to point protocol, Multiple Access Protocols: Pure ALOHA, Slotted ALOHA, CSMA, CSMA/CD, Token ring Reservation, Polling, FDMA, TDMA, CDMA.	10
	3	NetworkLayer: Internetworking devices: Repeaters, Hubs, Bridges, Switches, Router, Gateway Addressing: IP addressing, classful addressing, subnetting. Routing: Techniques, Static vs. Dynamic routing, Routing table for classful address, Flooding, Shortest path algorithm, Distance vector routing, Link state routing. Protocols: ARP, RARP, IP, ICMP, IPV6.	10

4	Transport Layer: Process to process delivery, UDP: Services and applications, TCP: Stream Oriented Service, Segment, Timers, Congestion control techniques: Avoidance and Detection.	8
5	Application Layer: DNS, SMTP, FTP, HTTP & WWW, Security: Cryptography, User authentication, Security protocols in internet, Firewalls. Recent research topic on networking.	7

<p>COURSE OUTCOMES: The students would have learnt</p> <p><u>CO1: Understand the working of different internet working devices.</u></p> <p><u>CO2: Understand the working of Internet.</u></p> <p><u>CO3: Understand the difference between OSI and TCP/IP.</u></p> <p><u>CO4: Understand the security mechanism in Networking.</u></p> <p><u>CO5: Understand core concept of</u></p>

Text Books:

1. Data Communications and Networking by B.A. Forouzan – TMH Publication.
2. Computer Networks by S. Tanenbaum – Pearson Education /

PHI Publication. Reference Books:

1. Internet working with TCP / IP by Comer – Pearson Education / PHI by Publication.
2. Data and Computer Communications by W. Stallings – PHI Publication.

4	Numerical Differentiation and Integration: Numerical Differentiation Newton's forward and Backward difference interpolation formula. Maxima and Minima of a Tabulated function, Numerical Integration:- Trapezoidal rule, Simpson's (1/3)rd and (3/8)th rule, Boole's rule, Weddle's rule. Difference Equations: Definition, order and degree of a difference equation Linear difference equations, Difference equations reducible to Linear form, simultaneous difference equations with constant coefficients	8
5	Numerical solution of ordinary differential equation: Taylor series method Euler's method, Modified Euler method Runge's method Runge-Kutta method, numerical method for solution of partial differential equations General linear partial differential equation. Laplace equation and Poisson equation.	7

COURSE OUTCOMES: The students would have learnt

CO1: Apply Numerical analysis, which has enormous application in the field of science and some fields of Engineering.

CO2: Familiar with finite precision computation.

CO3: Familiar with numerical solutions of nonlinear equations in a single variable.

CO4: Familiar with numerical integration and differentiation, numerical solution of ordinary differential equations.

Text Books:

1. Jain & Iyengar Numerical Methods for Scientific and Engineering Computations.
2. Rao G.S. Numerical Analysis.
3. Grewal B.S. Numerical Methods in Engineering and Science.
4. Das K.K. Advance Engineering Methods.
5. Rajaraman V. Computer Oriented Numerical Methods
6. P. Kandasamy K. Thilagavathy, K. Gunavathi, Numerical Methods, S. Chand & Company, 2nd Edition, Reprint 2012.
7. S.S. Sastry, Introduction methods of Numerical Analysis, PHI, 4th Edition, 2005.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. Computer Networks by S. Tanenbaum - Pearson Education / PHI Publication.

SubTitle:ITWORKSHOP(C++/PYTHON)LAB	
SubCode:CS203PPC01	No.ofCredits:1.5=0:0:1.5(L-T-P)
ExamDuration:3hours	IA+ESE=30+20

LabOBJECTIVE:

To discuss TurboC++ environment		
To discuss the various basic object oriented programming constructs like functions, properties and application.		
To discuss advanced programming concepts and program designing. Discussion Programming on file input output handling		
To discuss basic environment of python programming		
3.	<ul style="list-style-type: none"> To implement various data types and their memory requirements in TC++ programming 	
4.	<ul style="list-style-type: none"> To implement various in classes and members functions. 	
5.	<ul style="list-style-type: none"> To show matrix operation To implement functions function and argument passing methods 	
I, II, III, IV and V	<ul style="list-style-type: none"> To implement different function return types. To implement concept of polymorphism. To implement concept of virtual function and virtual class. To implement the concept file handling. To implement the concept of file importing in python environment. To implement the concept of coding and execution of introductory program. 	18

LABOUTCOMES: The students would have learnt

CO1:TC+

+programming Environment and programming I

DECO2:Implementation of basic object oriented operations

CO3:Implementation of advanced programming concepts.

CO4: Implementation of file input output streams and file

TextBooks:

1. ObjectOrientedProgrammingwithC++byE Balaguruswami, TMH
2. ObjectOriented Programmingwith C++byRobert Lafore, WaiteGroup
3. IntroductiontopythonbyBillLubovenibyO'Relly

ReferenceBooks:

1. ObjectOrientedProgrammingwithC++byMPBhaveS,A.Patekar,PearsonEducation
2. The CompletereferecebyHerbitSchildt,McGrawHill
3. The C++ Programming Language, Bajanstroustrup,AdditionWesley
4. Machine LearningTomM. Michell,McGrawHill ,Indianaddition
5. AppliedMachine Learning byM. Gopal,McGrawHillEducation

SubTitle: DIGITAL LOGIC & DESIGN LAB	
SubCode: CS203PES06	No. of Credits: 1.5=0:0:1.5(L-T-P)
Exam Duration: 3 hours	IA+ESE=30+20

Lab OBJECTIVE:		
Unit No.	Content	Teaching Hours
1	To discuss the fundamental concepts of digital logic design Identify various ICs and their specification.	
2	To discuss various logic Gates	
3	Design and implementation of combinational circuits. Design and implementation of sequential circuits	
4.	<ul style="list-style-type: none"> Implement 3 input AND gate using 2 input AND gates and 3 input OR gate using 2 input OR gates. Implement NAND gate using AND gates and NOR using OR gates. 	
5.	<ul style="list-style-type: none"> Design a circuit that evaluates the determinant of a 2 X 2 binary matrix (Note: State any assumptions made about input and output representations). Design a circuit that takes two unsigned 2-bit numbers (a and b), and displays one of greater (a > b), lesser (a < b) or equal (a == b) signals. Half Adder, Full Adder and Ripple Carry Adder Implementation. Add two 2-digit BCD numbers. Display using 7-segment displays. Subtract two 2-digit BCD numbers. Design Master Slave J-K Flip flop. Design a 2-bit Synchronous up counter using D flip flop IC's. Display the output on a 7-segment LED display Sequence generator using shift registers Design and verify 4-bit synchronous counter. 	18
I, II, III, IV and V		

<p>LAB OUTCOMES: The students would have learnt</p> <p><u>CO1: Understand the concepts of various components to design stable analog circuits.</u></p> <p><u>CO2: Represent numbers and perform arithmetic operations.</u></p> <p><u>CO3: Minimize the Boolean expression using Boolean algebra and design it using logic gates.</u></p> <p><u>CO4: Analyze and design combinational circuit.</u></p>
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TextBooks:

1. DigitalLogic&ComputerDesignPHIMMano
2. SwitchingCircuit&Finiteautomata–ZVIKohavi(TMh)

ReferenceBooks:

- 1.AnengineeringapproachtodigitaldesignPHIFletcherW.I**

SubTitle:COMPUTER NETWORK LAB	
SubCode:CS203PPC02	No.ofCredits:1.5=0:0:1.5(L-T-P)
ExamDuration:3hours	IA+ESE=30+20

OBJECTIVE:

Unit No.	Content	Teaching Hours
1, 2, 3, 4, 5	<ul style="list-style-type: none"> Study of different addresses (MAC, IP, Port and URL) used in computer network. Study of different types of transmission media. To implement point to point network using UTP cable and RJ-45 connector. 	
I, II, III, IV and V	<ul style="list-style-type: none"> Study of different commands used in Computer Network. Study of different networking devices used in Computer Network. To implement Local Area Network using Unmanaged Switch. To implement Local Area Network using Managed Switch. To implement the Virtual LAN using port based method of Managed Switch. To implement the Virtual LAN using subnet based method of Managed Switch. To implement Wireless LAN using Wireless Access Point and Wireless Adapter. 	18

LABOUR COMES: The students would have learnt

CO1: Understand the basic concept of Networking.
CO2: Understand the functionality of different devices.

CO3: Understand the designing of local Area Network using networking devices.
CO4: Understand addressing concept of networking.

CO5: Understand the designing of Wireless LAN.

TextBooks:

1. Data Communications and Networking by B.A. Forouzan - TMH Publication.
2. Computer Networks by S. Tanenbaum - Pearson Education / PHI Publication

ReferenceBooks:

1. Internetworking with TCP/IP by Comer - Pearson Education / PHI Publication.
2. Data and Computer Communications by W. Stallings - PHI Publication

SubTitle:DISCRETE MATHEMATICS		
SubCode:CS204TPC04	No.ofCredits:4=3:1:0(L-T-P)	Nooflecturehours/ week:04
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:45

UNIT No.	Syllabus Content	No of hours
1.	Sets, Relation and Function: Operations and Laws of Sets, Cartesian Products Binary Relation, Partial Ordering Relation, Equivalence Relation, Image of a Set Bijective functions, Inverse and Composite Function, Size of a Set, Finite and infinite Sets, Countable and uncountable Sets, Cantor's diagonal argument and The Power Set theorem, Schroeder-Bernstein theorem.	10
2.	Basic counting techniques-inclusion and exclusion, pigeon-hole principle, permutation and combination. Principle of Mathematical Induction, The Well-Ordering Principle, Recursive definition, The Division algorithm: Prime Numbers, The Greatest Common Divisor, Euclidean Algorithm, The Fundamental Theorem of Arithmetic.	10
3	Propositional Logic: Basic Connectives and Truth Tables, Logical Equivalence, The Laws of Logic, Logical Implication, Rules of Inference, The use of Quantifiers. Proof Techniques: Some Terminology, Proof Methods and Strategies, Forward Proof, Proof by Contradiction, Proof by Contraposition, Proof of Necessity and Sufficiency.	10

4	Algebraic Structures and Morphism: Algebraic Structures with one Binary Operation, Semi Groups, Monoids, Groups, Congruence Relation and Quotient Structures, Free and Cyclic Monoids and Groups, Permutation Groups Substructures, Normal Subgroups, Algebraic Structures with two Binary Operation, Rings, Integral Domain and Fields. Boolean Algebra and Boolean Ring, Identities of Boolean Algebra, Duality, Representation of Boolean Function, Disjunctive and Conjunctive Normal Form	8
5	Graphs and Trees: Graphs and their properties, Degree, Connectivity, Path Cycle, Sub Graph, Isomorphism, Eulerian and Hamiltonian Walks, Graph Colouring, Colouring maps and Planar Graphs, Four colour conjecture, trees and rooted trees, binary trees.	7

COURSE OUTCOMES: The students would have learnt

CO1: Students completing this course will be able to express a logic sentence in terms of predicates, quantifiers, and logical connectives.

CO2: Students completing this course will be able to apply the rules of inference and methods of proof including direct and indirect proof forms, proof by contradiction, and mathematical induction.

CO3: Students completing this course will be able to use tree and graph algorithms to solve problems.

CO4: Students completing this course will be able to evaluate Boolean

Text Books:

1. Kenneth H. Rosen, Discrete Mathematics and its Applications, Tata McGraw-Hill
2. Susanna S. Epp, Discrete Mathematics with Applications, 4th edition, Wadsworth Publishing Co. Inc.
3. C L Liu and D P Mohapatra, Elements of Discrete Mathematics A Computer Oriented Approach, 3rd Edition by, Tata McGraw-Hill.

Reference Books:

1. Erwin Kreyszig, Advanced Engineering Mathematics, 9th Edition, John Wiley & Sons, 2006.
2. J.P. Tremblay and R. Manohar, Discrete Mathematical Structure and It's Application to Computer Science", TMG Edition, Tata McGraw-Hill
3. Norman L. Biggs, Discrete Mathematics, 2nd Edition, Oxford University Press. Schaum's Outline Series, Seymour Lipschutz, Marc Lipson,
4. Discrete Mathematics, Tata McGraw-Hill

SubTitle:ELECTRONICDEVICE&CIRCUITS		
SubCode:CS204TES07	No.ofCredits:3=3:0: 0(L-T-P)	Nooflecturehours/ week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:36

COURSE OBJECTIVE:

To understand practical applications of PN junction diode.

To study basic principle of BJT, JFET and MOSFET and amplifiers.

To understand working of BJTs at low and high frequencies.

To understand the working of different types of feedback amplifiers. To understand the working of different types of oscillators.

UNIT No	Syllabus Content	No of Hours
1.	Junction Diode And Its Application: Properties of P-N Junction, Open Circuited P-N Junction, Current component of PN Diode, V-I Characteristics, Temperature dependence of V-I Characteristics, Diode resistance, Diode as a rectifier- Half wave & Full wave rectifier, Clipper, Clamper.	8
2	Bipolar Junction Transistor and FET: Introduction to Bipolar Junction Transistor, Transistor current components. Transistor as an amplifier, Transistor construction, Transistor Circuit Configuration (Common Base, Common Emitter, Common Collector) and Characteristics CE current gain, Analytical expression for transistor characteristics. Introduction to JFET, MOSFET, V-I and Transfer characteristics of JFET.	7
3	Low Frequency Transistor Amplifier: Graphical Analysis of CE amplifier, h-parameter Models, Transistor hybrid model, Analysis of Transistor amplifier using H-Parameter for CB, CE, CC configurations, Comparison of Transistor Amplifier Configuration, Darlington Pair. High Frequency: CE hybrid-pi model: Validity and parameter Variation, Current Gain with Resistive load, frequency response of a single stage CE Amplifier Gain-Bandwidth product.	7
4	Feedback Amplifier: Classification of feedback amplifier, Feedback concept, Properties of feedback amplifier, Effect of feedback on gain and impedance, Emitter and Source follower. Oscillator: Barkhausen criteria, Wien bridge, Tuned, Hartley, Colpitt and RC Phase shift oscillators.	7

5	Operational Amplifiers: OPAMP Symbol and terminal characteristics, Block Schematic of OPAMP, Ideal OPAMP Characteristics, Practical OPAMP Characteristics, Inverting Amplifier, Non-Inverting Amplifier, Voltage Follower, Adder, Subtractor, Comparator, Integrator, Differentiator, IC Timer-555, Introduction to Multivibrators, Monostable, Bistable, Astable Multivibrator.	7
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COURSE OUTCOMES: The students would have learnt

C01: Learn the design practical circuit using diodes.

C02: Learn the Characteristics of BJT, FET and MOSFET

C03: Evaluate frequency response to understand behavior of Electronics circuits.

C04: Analyze important types of integrated circuits and demonstrate the ability to design practical circuits that perform the desired operations.

Text Books:

1. Electronic Devices and Circuit Theory, Robert L. Boylestad & L. Nashelsky, K.L. Kishore, 9th Edition, PHI
2. Integrated Electronics: Analog & Digital Circuit Systems, Jacob Millman & Halkias, Tata McGraw Hill.
3. Microelectronics, Millman and Grabel, Tata McGraw Hill.
4. Integrated Circuits by K. R. Botkar, 9th Ed., Khanna Publications

Reference Books:

1. Electronic Devices & Circuits, Allen Mottershead, PHI.
2. Microelectronic Circuits, Sedra and Smith, 5th Edition, Oxford University Press.
3. Operational Amplifiers by R. Gayekwad, 4th Ed., Pearson Education

SubTitle:OPERATINGSYSTEM		
SubCode:CS204TPC05	No.ofCredits:4=3:1: 0(L-T-P)	Nooflecturehours/week:04
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:45

nts of an OS & their functions. To study the process management and scheduling.

er Process Communication (IPC) and the role of OS in IPC. **Syllabus Content**
 Memory management policies and virtual memory.

OS as a resource manager, file system manager, process manager, memory manager and I/O manager and methods used to in
 seoperating system with the advent of new computing technologies.

Unit No	Syllabus Content	No of Hours
1	Introduction to operating system objective and function. System components system services, system structure, batch interactive, time sharing and real time operating system, Protection. The introduction of window NT, DOS, Window 07 Unix, Linux (Red hat)	10
2	Concurrent Process: Process concepts, principal of concurrency. The producer consumer problem, the critical section problem, semaphore, classical problem in concurrency, interprocess communication, process generation, process scheduling.	10
3	CPU Scheduling: Scheduling concepts, performance criteria scheduling algorithms. Algorithm evaluation, multiprocessor scheduling. I/O management and Disk scheduling I/O devices and organization of the I/O functions. I/O buffering disk I/O operating system design issues.	10
4	Dead Lock system models, deadlock characterization, prevention, avoidance and detection recovery from deadlock, combined approach.	8

5	Memory Management: Basemachine, Residence monitor, multiprogramming with fixed partition, multiprogramming with variable partitions, multiple base register, paging, segmentation, paging segmentation, virtual memory concepts demand paging performance, page replacement algorithms, allocation of frames, thrashing, cache memory organization impact on performance.	7
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COURSE OUTCOMES: The students would have learnt

C01: Describe the important computer system resources and the role of operating system in their management policies and algorithms.

C02: Understand the process management policies and scheduling of processes by

CPU C03: Evaluate the requirement for process synchronization and coordination handled by operating system

C04: Describe

and analyze the memory management and its allocation policies

Text Books:

1. Milenkovic M., Operating System concepts, MGH
2. Tanenbaum A.S. Operating System design and implementation, PHI
3. Silberschatz A. and Patterson J.I., " Operating system concepts", Wiley.

Reference Books:

1. Stalling William, Operating System, Maxwell McMillan International Edition 1992.
2. Dectel H.N., An introduction to operating system, Addison Wesley.

SubTitle:DATASTRUCTURE&ALGORITHMS		
SubCode:CS204TPC06	No.ofCredits:4=3:1: 0(L-T-P)	Nooflecturehours/week:04
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:23

OBJECTIVE:

and and remember various algorithms and its analysis procedure. Understand the concept of data structures through ADT including List, Stack, Queues. To design and implement various data structure algorithms. To reduce various techniques for representation of the data in the real world. To develop application using data structure algorithms. To understand the complexity of various algorithms.

Sl. No	SyllabusContent	No ofHours
1	String algorithms, pattern search and editing, Arrays algorithms, developments simple examples of algorithm development, complexity, Divided & conquer, binary search, selection sort, insertion sort, merge sort, quick sort complexity of sorting.	10
2	Linear list: Stacks, application of Stacks, arithmetic notations, recursion, queues and circular queues, Linked list definition, insertion and deletion of nodes in circular and doubly linked list, Header nodes.	10
3	Trees, AVL trees, Threaded trees, Heapsort, B-tress.	10
4	Graph and representation: graph algorithms, optimization and Greedy methods, minimum spanning tree, shortest path, DFS, BFS search, examples of backtracking sets UNION and FIND operations tables and information retrievals, hashing.	8
5	Files: File organization, sequential file, direct file organization, index sequential file organization, Data storage and management.	7

COURSE OUTCOMES: The students would have learnt

C01: Select appropriated data structures as applied to specified problem definition.

C02: Implement operations like searching, insertion, and deletion, traversing mechanism etc. on various data structures.

C03: Students will be able to implement Linear and Non-Linear data structures. C04: Implement appropriate sorting/ searching technique for given problem.

TextBooks:

1. DataStructuresandAlgorithmAnalysisinC++,2/
ebyMarkAllenWeiss,PearsonEducationWirthNiclaus , Algorithm
DataStructureProgramsPHI
2. HorwitzE.andSahaniS.FundamentalsandDataStructure,ComputerSciencePress.
3. KnuthD. ThreathofComputerProgramming ", Vol 1-2 Addison -Wesley
4. AhoA.V.HopcraftandUllmanJ.E."DataStructureandAlgorithms,addisionWesley.

ReferenceBooks:

1. Tanonbaum,A.M.andAugenstein,M.J."DataStructurewithPascal"PHI.
2. TrambleyandSorenson "Data StructureusingPascal,MGH.
3. Stubbs D. Data Structure with Abstract Data Type and Modula 2, Brooks & Cole
PublicationComp.

SubTitle:MANAGEMENTPROCESSANDORGANIZATIONALBEHAVIOUR		
SubCode:CS204THS02	No.ofCredits:3=3:0: 0(L-T-P)	Nooflecturehours/week:03
ExamDuration:3hours	IA+ESE=30+70	Totalnoofcontacthours:23

<p>COURSEOBJECTIVES:</p> <ol style="list-style-type: none"> <u>Tohelpthestudentstodevelopcognizanceofthe importanceofManagement processes.</u> <u>Toenablestudentstodescribeshowpeoplebehaveunderdifferentconditionsandunderstandwhy peoplebehaveas they do.</u> <u>To provide the students to analyses specific strategic human resources demands for futureaction.</u> <u>To enable students to synthesize related information and evaluate</u>
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UNIT No	SyllabusContent	No ofHours
1	School of Management Thought: Evolution of Management thought, Systems andContingencyapproach of management, Decision TheorySchool.	10
2	Managerialprocesses,functions,skillsandrolesinanorganization.Nature,process and technique of planning, Organizing, Staffing, Directing, Coordinating,Control.	10
3	Behaviour:Concept,Significance,UnderstandingandManagingindividualbehavior–Personality,Perceptions,Values,Attitudes,Learning,Work-motivation,Individual Decision Making andProblem solving.	10
4	UnderstandingandManagingGroupProcesses:InterpersonalandGroupdynamics. Applications of emotional intelligence in organizations.Group decisionmaking,LeadershipandInfluenceProcess:Concept, stylesandTheories.	8
5	ManagingOrganizationalSystems,OrganizationalConflict–sources,patternlevelsandtypesofconflict.Organizationaldesignandstructure. Workstress.	7

COURSE OUTCOMES: On completion of this course, the students will be able to
C01: To understand the concept of Management.

C02 : Demonstrate the applicability of the concept of Management processes to understand the functioning of the organization.

C03 : Demonstrate the applicability of the concept of organizational behavior to understand the behavior of people in the organization.

C04: Analyze the complexities associated with management of the

Suggested Readings

1. Koontz, Harold, Cyril O'Donnell, and Heinz, Whelrich. Essentials of Management. New Delhi: Tata McGraw Hill.
2. Robbins, S.P. Organizational Behaviour. New Delhi: PHI.
3. Luthans, F. Organisational Behaviour. New York: McGraw Hill.

SubTitle: DATASTRUCTURE&ALGORITHMSLAB	
SubCode:CS204PPC03	No.ofCredits:1.5=0:0:1.5(L-T-P)
ExamDuration:3hours	IA+ESE=30+20

OBJECTIVE:

stand and remember algorithms and its analysis procedure.
 Understand the concept of data structures through ADT including List, Stack, Queues. To design and implement various data structure algorithms.
 Produce various techniques for representation of the data in the real world. To develop application using data structure algorithms.
 Understand the complexity of various algorithms.

Unit No.	Content	Teaching Hours
3, 4, 5, 6, I, II, III, IV and V	<ul style="list-style-type: none"> To implement the CPP program for Insert the values in Array. To implement the CPP program for Delete the values in Array. To implement the CPP program for Update the values in Array. To implement the CPP program for Addition, Subtraction and Multiplications of the integer values in Array. To implement the CPP program for String algorithms. To implement the CPP program for pattern matching in strings. To implement the CPP program for insertion, deletion in one way LINKLIST. To implement the CPP program for insertion, deletion in two way LINKLIST. To implement the CPP program for insertion, deletion in circular LINKLIST. To implement the CPP program for insertion, deletion in doubly LINKLIST. To implement the CPP program for insertion, deletion in header LINKLIST. To implement the CPP program for insertion, deletion in header doubly LINKLIST. To implement the CPP program for TREE structure. To implement the CPP program for pre-order, in-order, post-order of any Binary TREE. To implement the CPP program for Binary search. To implement the CPP program for Quick sort. To implement the CPP program for insertion sort. To implement the CPP program for Bubble sort etc 	18

LABOUTCOMES:The students would have learnt

CO1:Select appropriatedatastructuresas applied tospecifiedproblemdefinition.

CO2:Implementoperationslikesearching,insertion,anddeletion,traver singmechanismetc.onvarious datastructures.

CO3:StudentswillbeabletoimplementLinearandNon-Linear datastructures.CO4:Implement appropriatesorting/ searchingtechniqueforgivenproblem.

TextBooks:

1. Data Structures and Algorithm Analysis in C++, 2/e by Mark Allen Weiss, Pearson Education Wirth Niclaus , Algorithm +DataStructure Programs, PHI
2. FundamentalsandDataStructure, byHorwitzE.andSahaniS., ComputerSciencePress.
3. ThreatofComputerProgramming, byKnuthD., Vol1-2 Addison-Wesley
4. DataStructureandAlgorithms, byAhoA.V.HopcraftandUllmanJ.E., AddisonWesley.

ReferenceBooks:

1. DataStructurewith Pascal, Tanonbaum , A. M. andAugenstein , M.J.PHI.
2. DataStructureusingPascal, byTrambley and SorensonMGH.
3. DataStructurewithAbstractDataType andModulabyStubbsD.2", Brooks&ColePublicationComp.

SubTitle:OPERATINGSYSTEMLAB	
SubCode:CS204PPC04	No.ofCredits:1.5=0:0:1.5(L-T-P)
ExamDuration:3hours	IA+ESE=30+20

LabOBJECTIVE:

To learn Unix commands and shell programming
 To implement various CPU Scheduling Algorithms
 To implement Process Creation and Inter Process Communication.
 To implement Deadlock Avoidance and Deadlock Detection Algorithms
 To implement Page Replacement Algorithms
 To implement File Organization and File Allocation Strategies.

Unit No.	Content	Teaching Hours
3	Basics of UNIX commands	
4.	<ul style="list-style-type: none"> Write programs using the following system calls of UNIX operating system fork, exec, getpid, exit, wait, close, stat, opendir, readdir 	
5.	<ul style="list-style-type: none"> Write C programs to simulate UNIX commands like cp, ls, grep, etc. 	
6.	<ul style="list-style-type: none"> Shell Programming 	18
I, II, III, IV and V	<ul style="list-style-type: none"> Write C programs to implement the various CPU Scheduling Algorithms Implementation of Semaphores Implementation of Shared memory and IPC Bankers Algorithm for Deadlock Avoidance Implementation of Deadlock Detection Algorithm Write C program to implement Threading and Synchronization Applications 	

LABOUTCOMES: The students would have learnt

C01: Compare the performance of various CPU Scheduling Algorithms
C02: Implement Deadlock avoidance and Detection Algorithms

C03: Implement Semaphores

C04: Create processes and implement IPC

C05: Analyze the performance of the various Page

TextBooks:

1. Operating System concepts, Milenkovic M.,MGH
2. OperatingSystem designand implementation, Tanenbaubm A. S.,PHI
3. Operatingsystemconcepts,SilberschartzA.andPattersonJ.I.,Wisley.

ReferenceBooks:

1. OperatingSystem,Stilling William,Maxwell McMillanInternationalEdition1992.
2. Anintroductionto operating system, DectelH.N.,AddisionWisley.

SubTitle:ELECTRONICDEVICE&CIRCUITSLAB	
SubCode:CS204PES07	No.ofCredits:1.5=0:0:1.5(L-T-P)
ExamDuration:3hours	IA+ESE=30+20

LabOBJECTIVE:		
Unit No	Content	Teaching Hours
1	To identify and test various electronic components. To use DSO for various measurements.	
2	To plot the characteristics of diode and transistor.	
3.	To design and implement feedback amplifier circuits. To measure the frequency of oscillators.	
4.	<ul style="list-style-type: none"> To draw the characteristics of a semiconductor p-n junction diode and to find cut-in voltage, reverse resistance, static resistance and dynamic resistance. 	
5.	<ul style="list-style-type: none"> To design a half wave rectifier and to determine its efficiency and ripple factor. 	
I, II, III, IV and V	<ul style="list-style-type: none"> To design a centre tap full wave rectifier and determine the ripple factor and efficiency. To design a bridge full wave rectifier and determine the ripple factor and efficiency. To draw the characteristics of CE configuration of a transistor amplifier. To draw the characteristics of CB configuration of a transistor amplifier. To draw the characteristics of CC configuration of a transistor amplifier. To draw the characteristics of JFET (N-channel/P-Channel). To draw the characteristics of MOSFET (Depletion Type / Enhancement Type). To draw Static input and output characteristics curves of CE transistor and determine its h-parameter values. To draw Static input and output characteristics curves of CC transistor and determine its h-parameter values. 	18

	<ul style="list-style-type: none"> • Study of various topologies of feedback amplifier. • To Design Wein Bridge Oscillator and determine the frequency of Oscillation. • To Design RC phase shift oscillator and determine the frequency of Oscillation. 	
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LABOUR COMES: The students would have learnt

CO1: Understand the diode and transistor characteristics.

CO2: Verify the rectifier circuits using diodes and implement them using hardware.

CO3: Design various amplifiers like CE, CC, common source amplifiers and implement them using hardware and also observe their frequency responses

CO4: Understand the construction, operation and characteristics of JFET and

Text Books:

1. Lab Manual of Basic Electronics by Paul BZbar, TMH
2. Laboratory Manual for Electronic Devices and Circuits, 4th Ed., David A. Bell, PHI
3. Electronic Devices and Circuit Theory, Robert L. Boylestad & L. Nashelsky, K.L. Kishore, 9th Edition, PHI
4. Integrated Electronics: Analog & Digital Circuit Systems, Jacob Millman & Halkias, Tata McGraw Hill.
5. Microelectronics, Millman and Grabel, Tata McGraw Hill.
6. Integrated Circuits by K. R. Botkar, 9th Ed., Khanna Publications

Reference Books:

1. Electronic Devices & Circuits, Allen Mottershead, PHI.
2. Microelectronic Circuits, Sedra and Smith, 5th Edition, Oxford University Press.
3. Operational Amplifiers by R. Gayekwad, 4th Ed., Pearson Education

