Department of Information Technology

COURSE OUTCOME

Course Code	CourseTitle	Unittitle	LearningOutcomes
UGIT101	ImperativeProgramming	UnitI Introduction,StructureofCProgram AndFundamentals(NotionalHours:12)	1. StudentwillabletounderstandHistoryofCLanguage. 2. StudentwillabletowriteaProgramCodeusingClanguage. 3. ToCompileandExecutingProgramCode. 4. StudentwillabletounderstanduseofVariable. 5. ToImplementingExpression,Statement,Constant,#defineand #include
		UnitII OperatorsandExpressions,DataInputandOutput (NotionalHours:12)	1. StudentwillabletounderstanddifferenttypesofOperatorsuseinCprogram. 2. StudentwillabletoevaluateConceptofOperatorsandexpressionsincoding. 3. StudentwillabletouseofFormattedandunformattedinputand output. 4. StudentShouldabletodifferentiatebetweenFormattedandunformattedinputandoutput.
		UnitIIIConditionalStatementandLoops ProgramStructure(NotionalHours:15)	1. Tounderstandif,if-else,nestedif-elseandswitchstatementinC. 2. ToImplementingtheuseofLoops:forloop,whileloop,dowhileloop. 3. TounderstandandevaluateconceptofJumpStatementandInfinite Loop.
\			4. ToanalyseuseofVariablewithstorageClasses.
		UnitIV FunctionandString(NotionalHours15)	1. Tounderstandtheconceptoffunction. 2. Studentsshouldbeabletoexplainthedifferencebetweencallbyvalueand callbyreference.
		UnitV Array (NotionalHours15)	1. TounderstandtheconceptofArray. 2. Toprepareaflowchartofisolationofplasmids,transpositionmechanism.
		UnitVI Pointers,StructureandUnion(NotionalHours15)	1. Toanalysingandimplementingpointeraddressoperatorandfunctionwithpointer. 2. TounderstandhowtoapplypointerArithmeticinC.
UGIT101	PRACTICAL	-	

Course Code	CourseTitle	Unittitle	LearningOutcomes

UGIT102	WebProgram ming	UnitI FundamentalsWeb,HTML5,Table(N otionalHours:10)	Thelearnerwillbeableto- 1. KnowthebasicconceptsofWeb.[1]* 2. KnowthebasicconceptsofHTML5.[1]* 3. RecognisethefeaturesofHTML5.[2]* 4. DescribetheattributeofTable.[4]* 5. DistinguishbetweenCellspacingandCellpadding.
		UnitII HTML5Pagelayoutandnavigation,Creatingdivi sionbasedlayouts,Media (NotionalHours:10)	Thelearnerwillbeableto- 1. Recognisethefeaturesofpagelayout.[2]* 2. Examinedifferenttagsinpagelayout.[4]* 3. SystematicallydeveloptheHTML5file.[6]* 4. Understandthetypesofnavigation.[2]* 5. Studydifferenttypesofmedia.[3]*
		UnitIII Forms,StyleSheets(N otionalHours:10)	Thelearnerwillbeableto- 1. EvaluatetheneedofForms.[5]* 2. Studythebasiccontrolsofform.[3]* 3. Studydifferenttypesofstylesheetandselector.[3]*
			4. Performproperformdesigning[3]*
		UnitIV JavaScript,Operators(NotionalHours10),	Thelearnerwillbeableto- 1. KnowthebasicconceptsofJavaScript.[1]* 2. Studytheworkingofjavascript.[3]* 3. Applydifferentoperatorsasperrequirement.[3]* 4. InfertheneedofJavaScript.[5]*
		UnitV CoreJavaScript(PropertiesandMethodsofEach), Documentanditsassociatedobjects(N otionalHours10)	Thelearnerwillbeableto- 1. Stydypropertiesandmethodsofarray,string,math ,number,date,etc.[3]* 2. DescribethenDOM.[2]* 3. WriteJavaScriptprogram.[1]*
		UnitVI LayerEventsandEventHandlers(N otionalHours10)	Thelearnerwillbeableto- 1. RecognisetheneedofEventHandling.[2]* 2. Understanddifferenttypesofevent.[2] 3. IllustratetheapplicationofEvents[3]* 4. Writeaprogrambasedonspecificevent.[1]*

UGIT1P2	PRACTICAL SESSIONS	-	Thelearnerwillbeableto- 1. WritetheprograminHTML5.[1]* 2. ApplyMultimediafeaturestowebpage.[3]* 3. GeneratetheLists,Tables,Frames,Forms.[6]* 4. Studyhowtoapplycsstowebpage.[1]* 5. PerformImageMapping.[3]* 6. Developconnectivitywithexternaljavascript.[6]* 7. Createjavascripttoworkingwithoperators,loops,event,array,stringetc.[6]*
			8. PerformValidationusingjavascript.[3]* 9. Writejavascriptcodefordemonstrationofdifferentevents.[1]*

Course Code	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT103	Operating System	UnitIIntroduction Whatisanoperatingsystem? (NotionalHours:12)	Thelearnerwillbeableto- 1. Describingtheimportantcomputersystemresourcesandtheroleofoperatingsystemintheirmanagementpoliciesandalgorithms.[2]* 2. IdentifytheClassesofOperatingSystems.[2]* 3. RecallAssemblers,CompilersandInterpreters,Linkers.[1]* 4. Researchondifferenttyepsofoperatingsystem[2]* 5. Analysethedifferentsystemlikedistributedandmodernoperatingsystems,DesktopSystems,HandheldSystems,ClusteredSystems[4]*
		UnitII Operating-SystemStructures(NotionalHours:12)	Thelearnerwillbeableto- 1. Listingtheoperating-SystemServices.[1]* 2. ExplainingKernelArchitectureandBootingProcess(POWERON,BIOS-POST,MBR.[1]* 3. DescribingtheworkingSystemCalls,TypesofSystemCalls[2]* 4. AnalyzethestructureofoperatingsystemandbasicarchitecturalcomponentsinvolvedinOSdesign[4]* 5. IdentifytheLayeredApproach,,MicroKernels,VirtualMachines.[2]*

		UnitIII ProcessesandProcessSynchronization(NotionalHours:6)	Thelearnerwillbeableto- 1. DescribingProcessScheduling,SchedulingCriteria[2]* 2. UnderstandtheprocessmanagementpoliciesandschedulingofprocessesbyCPU[2]* 3. RecognizethemeaningofSchedulingAlgorithms.[2]* 4. SolvevariousproblembasedonSchedulingAlgorithms.[3]* 5. Evaluatetherequirementforprocesssynchronizationandcoordinationhandledbyoperatingsystem[5]*
		UnitIV MemoryManagement(NotionalHours6)	Thelearnerwillbeableto- 1. Describeandanalyzethememorymanagementanditsallocationpolicies.[2]* 2. Identifyuseandevaluatethestoragemanagementpolicieswithrespecttodifferentstoragemanagementtechnologies.[2]* 3. Dicussonaddressspacesandvirtualmachinesmeaning.[2]* 4. Understandthepagereplacementalgorithmsformemorymanagement.[2]* 5. Solvevariousproblembasedonpagereplacementalgorithms.[3]*
		UnitV FileSystems(NotionalHours12)	Thelearnerwillbeableto- 1. KnownthemeaningofFiles,directories.[1]* 2. Recognisethefilesystemmanagementandoptimization.[1]* 3. IdentifytheMS-DOSfilesystem,UNIXV7filesystem,CDROMfilesystem.[1]* 4. Understandandanalysetheoryandimplementationoffile.[2]* 5. UnderstandtheRAIDStructure,Partitionandfilesystems(ext3,ext4,xfs,cifs) ,I-nodes.[2]*
		UnitVIInput-Output,Deadlocks(Notional Hours12)	Thelearnerwillbeableto- 1. Recallthemeaningofuserinterfaces,I/Ohardware,I/OsoftwareandoperatingsystemResources.[1]* 2. DescribingtheI/Osoftwarelayers,disks,clocks.[2]* 3. UnderstandtheMutualexclusion,Deadlockdetectionandrecovery, deadlockavoidance,deadlockprevention,issues.[2]* 4. SolvevariousproblembasedonDeadlockcondition.[3]*

UGIT3P5	PRACTICAL SESSIONS	-	Thelearnerwillbeableto- 1. PerformingInstallationoftheWindowsOperatingSysteminvirtua lmachine 2. PerformingmostfrequentlyusedMS-DOScommands.[3]* 3. PerformMS-DOScommands.relatedtofilesanddirectories.[3]* 4. PerformmostfrequentlyusedLinuxcommands.[3]* 5. PerformLinuxcommandsrelatedtofilesanddirectories.[3]* 6. PerformWorkingwithLinuxDesktopandutilities[3]* 7. Performscripttofindoutduplicatefile.[3]* 8. Performscripttocheckpartitionssize.[3]* 9. Performscripttoinoutinteractiveandnon-interactiveusers. [3]* 10. Performscripttotakebackupoftarliefromservertoanotherremotes erver.[3]*

Course Code	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT104	DiscreteMat hematics	UnitI Introduction,SetTheory,Logic.(N otionalHours:15)	1. DefinethesetanddifferenttypesofSubset.AndalsoListouttheoperation sonSet.[2]* 2. ByusingTruthtable,IdentifythestatementsareValidorInvalid Statements.[2]* 3. DiagrammaticallyExplanationofSetTheory.[2]* 4. ToShowtherelationBetweenSets.[3]* 5. DiscusstheallLaw'sofSetTheoryandLogic.[2]* 6. GiveanExampleofSetsandLogic.[2]*
		UnitII QuantifiedStatement,ElementaryN umberTheoryandMethodsofProof (NotionalHours:15)	1. DefinePredicatesandExplainQuantifiedStatements.[2]* 2. RecognisethePredicatesandQuantifiedStatements.[2]* 3. ShowtheArgumentswhetheritisvalidorInvalidwithQuanti fiedStatement.[3]* 4. UnderstandtheRationalNumbersandDivisibility.[2]* 5. ExplainandSolvetheExamplesofQuotientRemindertheorem.[2]* 6. SolveDiagrammaticallynumericalofFloorandCeiling.[4]*
		UnitIII Sequences,MathematicalInduction,an dRecursion. (NotionalHours:15)	1. Identifyrecurrencerelations,Generationfunctionandoperationsonthe m.[2]* 2. DemonstrateStrongMathematicalInductionandtheWell-OrderingPrinciplefortheIntegers.[3]* 3. IllustratetheCorrectnessofalgorithmsbyusingExamples.[3]*

		UnitIV Function,Relations(Notion alHours15)	1. DefineFunctionandRelation.[2]* 2. ClassifyingthedifferenttypesofFunction.[2]* 3. TobetterRelationsCompareReflexivity,Symmetry,andTrans itivityofRelation.[5]* 4. Examinetheproblems thenSolve thatproblemsbasedon generalrecursivedefinitionsandstructuralinduction,func tions[2]*
		UnitV GraphsandTrees(Notional Hours15)	1. DiscussalltypesofGraphs.[2]* 2. Byconstructingthegraphwecaneasilyunderstandtheconceptandwor kingofasystem.[3]* 3. CategoriesthedifferentkindofTechniquesandAlgorithmsforgetting ShortestPathofGraph.[4]* 4. DrawsuitabletreeDiagramforbetterUnderstandtheflowofGraph.[3]*
		UnitVI CountingandProbability(NotionalHours15)	1. DefineCountingandProbability.[2]* 2. ToIdentifygivenprobabilitieswemustobservethetotalnumberofOutc omes.[2]* 3. WritetheExamplesofAdditionRuleandPigeonHolePrinciple. [1]* 4. SolvetheExamplesbyusingAlgorithmstofindoutShortestPathof GivenGraph.[3]*

CourseCode	CourseTitle	Unittitle	LearningOutcomes
UGIT1P4	PRACTICALS ESSIONS	-	1. ImplementTheProgramsforSetTheory.[3]* 2. ImplementtheprogramforPropertiesofIntegers.[3]* 3. ConstructtheProgramtoimplementGreatestCommonDivisorandFundamentaltheoremofArithmeti c.[3]* 4. DrawtheGraphsbyusingGraphtheory.[3]* 5. ImplementtheprogramsforPropertiesofOperationsandRootsofPolynomials.[3]* 6. ImplementtheProgramforSumRulePrincipleandFactorial.[3]* 7. Applytheprobabilities forSamplespaceevents,FinitesprobabilityspaceandEquiprobableSpaces.[3]* 8. ImplementtheAdditionPrincipleandIndependentEventsinProgram.[3]*

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UGIT105	DigitalElectronics	UnitI NumberSystem,BinaryArithmetic(NotionalHours:10)	Thelearnerwillbeableto- 1. Rememberingtolearnabouthowcomputersystemsworkandunderlyingprinciples.[1]* 2. Understandingthebasicsofdigitalelectronicsneededforcomputers.[2]* 3. Applyingthecodesandnumbersystemsconvertingcircuits.[3]* 4. Compareandcontrastbetweenagivennumbersfromonesystemtoanequivalentnumberinanothersystem.[4]* 5. Illustratetheconstructionofaweightedcode.[3]* 6. Explainingtoencodeeachdecimalsymbolinauniquestringof0sand1s.[2]*
		UnitII BooleanAlgebraandLogicGates,Minterm,MaxtermandKarnaughMaps (NotionalHours:10)	Thelearnerwillbeableto- 1. Designvariouslogicgatesandsimplifybooleanequations.[6]* 2. DescribelogicalAND,OR,NOT,NAND,NOR,EX-OR,EX-NOR functions.[1]* 3. ExplainsthesimplificationoflogicalstatementswithusingBooleanrulesandde-Morgantheorems.[2]* 4. Usingtruthtableandshowsitslogiccircuitswritesbooleanequation.[2]* 5. Comparethemintermandmaxterm.[4]*
			6. Summarizeanddefinethesimplificationoflogicalstatementswithkarnaughmaps.[2]*
		UnitIII CombinationalLogicCircuits, ArithmeticCircuits(NotionalHours:10)	Thelearnerwillbeableto- 1. AnalyseanddesigncombinationalcircuitsusingcommerciallyavailableICs.[4]* 2. Explainingconceptofcombinationalcircuitsforgivenapplication.[2]* 3. Summarizecodeconvertersdesignandimplementations.[2]* 4. Implementcombinationallogiccircuitsusingprogrammablelogicdevices.[3]* 5. Schematically/Diagrammaticallyelaboratearithmeticcircuits.[4]*

		UnitIV Multiplexer,Demultiplexers,ALU,EncoderandDecoder,SequentialCircuits:Flip-Flop(NotionalHours10)	Thelearnerwillbeableto- 1. Compare&contrastbetweenMultiplexerandDemultiplexers.[4]* 2. Diagrammaticallyexplainthelogicdiagramandtruthtablesofmultiplexeranddemultiplexer.[4]* 3. Summarizetheapplicationsofmultiplexersanddemultiplexer.[2]* 4. Designencoderanddecoder.[6]* 5. Designandanalysessynchronousandasynchronoussequentialcircuitsusingflip-flops.[6]*
		UnitVCounters(NotionalHours10)	Thelearnerwillbeableto- 1. Compare&contrastbetweenSynchronousandAsynchronousCounter.[4]* 2. Designdifferenttypesofcounters.[6]* 3. ExplaintheconceptPresettablecounter.[2]* 4. UnderstandingtheideaofBushing.[2]*
			5. ParaphrasetheconceptofTypeTDesign,TypeJKDesign.[2]* 6. ExplaintheconceptofIC7493,IC7490,IC7492.[2]*
		UnitVI ShiftRegister(NotionalHours15)	Thelearnerwillbeableto- 1. Understandtheconceptandapplicationofregistersandshiftregisters.[2]* 2. Classifytheshiftregisteraccordingtothemethodsofdatainput/outputSISO,PIPO,SIPO,PISO.[2]* 3. Designvariousshiftregistersanddeterminingoutputs.[6]* 4. Explaintheoperationandapplicationof RingcounterandJohnsoncounter.[2]* 5. Understand theIC7495isan8pinshiftregister.[2]* 6. SummarizetheSevensegmentdisplaysandanalysisofshiftcounters.[2]*

UGIT1P5	PRACTICAL SESSIONS		Thelearnerwillbeableto- 1. StudyofLogicgatesandtheirICsanduniversalgates.[3]* 2. ImplementthegivenBooleanexpressionsusingminimumnumberofgates, combinationalcircuits,codeconverter,AdderandSubtractorArithmeticcircuits, [3]* 3. ImplementEncodeandDecoderandMultiplexerand Demultiplexers.[3]* 4. Studyofflip-flopsandcounters.[3]* 5. StudyofcounterICsanddesigningMod-Ncounters.[3]* 6. Designofshiftregistersandshiftregistercounters.[6]*

Course Code	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT106	Fundamentalsof ComputerOrganization	UnitI DataRepresentation(NotionalHours:12)	Thelearnerwillbeableto- 1. Knowdifferentnumbersystem.[1]* 2. Applyingthecodesandnumbersystemsconvertingcircuits.[3]* 3. Compareandcontrastbetweenagivennumbers fromonesystemtoanequivalentnumberinanothersystem.[4]* 4. Solvetheproblemsofcomplements[3]*
		UnitII DigitalLogicCircuits(NotionalHours:12)	Thelearnerwillbeableto- 1. DesignvariouslogicgatesandsimplifyBooleanequations.[6]* 2. DescribelogicalAND,OR,NOT,NAND,NOR,EX-OR,EX-NORfunctions.[1]* 3. Designandanalysesynchronousandasynchronous sequentialcircuitsusingflip-flops.[6]* 4. Summarizeapplicationofflipflop[3]* 5. Describesequentialcircuits[2]*
		UnitIII DigitalComponents(NotionalHours:12)	Thelearnerwillbeableto- 1. Diagrammaticallyexplaindecoder,encoder,multiplexer,registers[4]* 2. Designencoderanddecoder.[6]* 3. Summarizeapplicationofshiftregister[3]*
			4. Describememoryunit[2]* 5. Comparedifferentmemoryunits[4]*

		UnitIV RegisterTransferandMicroOperations,BasicComputerOrganizationandDesign(NotionalHours12)	Thelearnerwillbeableto- 1. Useregistertransferlanguage[3]* 2. Illustrateworkingofbinaryadder[3]* 3. Describebinaryincrementer[2]* 4. Categoriestypesofmicro-operation,staterelationshipbetweeninstructionandmicro-operation[4]* 5. Describeinstructioncode,inputoutputand interrupt[2]* 6. Illustratestepsinvolveininstructioncycleandmemoryreferenceinstructionwithexample[3]*
		UnitV CentralProcessingUnit(NotionalHours12)	Thelearnerwillbeableto- 1. Describegeneralregisterorganization,instructionformatwithexample[2]* 2. Classifyinstructionbasedonnumberofaddress fields[4]* 3. Illustratedifferentaddressmodewithexample[3]* 4. CompareandconstructbetweenRISCandCISC[4]*
		UnitVI InputOutputOrganization,MemoryOrganization(NotionalHours12)	Thelearnerwillbeableto- 1. Knowperipheraldevices[1]* 2. Describeinputoutputinterface,directmemoryaccesswithexample[2]* 3. Illustrateasynchronousdatatransfer[3]* 4. Demonstratepriorityinterrupt[3]* 5. ShowcommunicationbetweeninputoutputprocessorandCPU[3]* 6. Diagrammaticallyexplainmemoryhierarchy[4]*
UGIT1P6	PRACTICAL SESSIONS		Thelearnerwillbeableto- 1. Diagrammaticallyexplainmotherboardandidentify

			itsvariouscomponents[4]* 2. Compareandcontrastbetweentypesofmotherboard[4]* 3. Compareandcontrastbetweentypesofmonitors[4]* 4. IllustrateworkingofSMPSandstateitstype[3]* 5. Describebootingprocess[2]* 6. Describeports,devicedriver[2]* 7. Illustratestepsinvolvingformattingandinstalling OS[3]* 8. Discussfeaturesofcontrolpanel[2]* 9. CompareandcontrastbetweenvariousRICSandCISCprocessors,P1,P2,P3,P4andcoreprocessor[4]* 10. Illustrateupgradingcomputer[3]* 11. UnderstandingCMOS[2]*

Course Code	**Course Title**	**Unit title**	**Learning Outcomes**
UGIT201	Object Oriented Programming	Unit I Object Oriented Methodology, Principles ofOOPS (Notional Hours: 12)	The leaner will be ableto 1. Describe POP, its characteristic[2]* 2. Describe OOP, its characteristic[2]* 3. Distinguish between OOP and POP[4]* 4. Describe basic concept of OOP[2]* 5. Define benefits of OOP and to list application of OOP.[2]*
		Unit II Classes and Objects , Constructors and Destructors(Notional Hours: 12)	The leaner will be ableto 1. Define concept classes and objects[2]* 2. Takeaproblemanddevelopthestructuresto representobjectsandthealgorithmstoperform operations.[6]* 3. Apply data abstraction principle to programs[3]* 4. Constructtheprogramswhichwillsharecommon data withitsobjectusingstatickeyword concept[6]* 5. Define and useconstructor and destructor for memory management[3]*
		Unit III Polymorphism (Notional Hours:12)	The leaner will be ableto 1. Understand and demonstrate concept of polymorphism for operator overloading [3]* 2. Implement static polymorphism[3]*

			3. Use operator overloading for unary and binary operator[3]* 4. Illustrate data conversion between data type and object.[3]*
		Unit IV Programdevelopment using Inheritance (Notional Hours:12)	The leaner will be ableto 1. Describe the concepts of Inheritance.[2]* 2. Discuss different concept of inheritance[2]* 3. Apply data hiding in inheritance.[3]* 4. Creatingvirtual base classes.[6]* 5. Use concept of abstractclasses.[3]* 6. Recall and revise the concept of constructor and apply it in inheritance[3]*
		UnitV Virtual Functions, Exception handling (Notional Hours:12)	The leaner will be ableto 1. Describe the concepts of dynamic polymorphism.[2]* 2. Define and implement this pointer. [3]* 3. Illustrate use of pointer to derive classes[3]* 4. Apply concept of exception handling to develop sophisticated program[3]*
		Unit VI Template, Working with files (Notional Hours:12)	The leaner will be ableto 1. Define concept of generic programming[2]* 2. Implement the concept oftemplate for class and functions[3]* 3. Create programs to store and retrieve information fromexternal files.[6]*
UGIT2P1	Practical	-	The leanerwill be ableto 1. Implement concept of classes and objects[3]* 2. Implement concept offriend function[3]* 3. Implement concept of constructor and destructor[3]* 4. Implement concept of operator overloading[3]* 5. Implement concept of Inheritance[3]* 6. Implement concept of virtual functions and
\			abstract classes[3]* 7. Performvarious operation on string[3]* 8. Implement concept of exception handling[3]* 9. Implement concept of file handling[3]* 10. Implement concept of template[3]*

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UGIT202	MicroprocessorArchitecture	UnitIMicroprocessor, microcomputerandassembly language. MicroprocessorArchitectureandMicrocomputerSystem8085MicroprocessorArchitectureandMemoryInterface (NotionalHours:15)	1. Todescribemicroprocessorbasedsystem.[2]* 2. Todescribetheuseofmicroprocessorasa CPU.[2]* 3. Towritedefinitionsoftermssuchaswordlength,byte,nibble,instructions.[1]* 4. Toexplainmachinelanguage,assemblylanguage,highlevellanguages.[2]* 5. Todistinguishbetweenmachinelanguageandhighlevellanguage.[4]* 6. Toclassifythecomputersystems.[2]* 7. Todescribethemicroprocessorbasedtemperaturecontrolsystem.[2]* 8. Todescribevariousbusesin8085microprocessor.[2]* 9. Toexplainoperationsinitiatedbymicroprocessor[2]* 10. Toexplaininternaldataoperationsof8085microprocessor.[2]* 11. Toexplainexternalorperipherallyinitiatedoperationsof8085microprocessor.[2]* 12. Todescribememory,structureanditsrequirements.[2]* 13. Toexplaintheuseofflipflopasbasicstorageelementandintheformationofmemoryregister [2]* 14. Toillustratethememoryaddressrangeofvariousmemorychips.[3]* 15. Todrawthememoryinterfacingdiagram[3]* 16. Tointerprettheaddressmapofvariousmemorychips.[2]* 17. Toclassifymemoryintodifferenttypes.[2]* 18. Todescribememoryinterfacingtechniques.[2]*
			19. Toexplainvarioustristatedevicesusedinmicroprocessorbasedsystem.[2]* 20. Todescribethe8085microprocessorarchitecture[2]* 21. Todescribeflagregisterof8085microprocessor[2]* 22. Todescribefunctionalpinconfigurationof8085microprocessor.[2]* 23. Toillustratethestepsinvolvedindataflowwhenaninstructioncodeisfetchedfromthememory.[3]* 24. Toexplainthedemultiplexingofaddress/databusof8085microprocessor.[2]* 25. Toshowgenerationofcontrolsignals.[1]* 26. Todescribevarious8085machinecycles.[2]* 27. To calculate address lines required for decoding address for various range ofmemorychips.[4]* 28. Todescribeaddressdecodinganditstechniques.[2]* 29. Todistinguishbetweenaddressdecodingtechniques.[4]* 30. Toanalysevariousinterfacingcircuitsandinterpretingaddressmap.[4]*

		UnitII InterfacingI/ODevicesIntroductionto8085AssemblyLanguageProgrammingIntroductionto8085Instructions (NotionalHours:15)	1. TodescribetheperipheralI/Oinstructionsof8085microprocessor.[2]* 2. TocomparetheworkingofperipheralI/Oinstructionsin8085microprocessor.[5]* 3. Toillustratedatatransferanddeviceselection[3]* 4. TodesigninterfacingcircuitsforinterfacingI/OdevicesusingDecoder.[6]* 5. Toanalysetheinterfacingcircuitandinterpretingaddressofoutputport.[4]* 6. Todesigninterfacingcircuitforseven-segmentLEDoutputportandanalyzingthecircuit.[6]* 7. Todesignaninterfacingcircuitfor8DIPswitchesandanalyzingthecircuit.[6]* 8. ToexplainmemorymappedI/Oinstructionsanditsexecution.[2]* 9. ToanalysetheinterfacingcircuitofsafetycontrolsystemusingmemorymappedI/Otechnique.[4]* 10. Todescribetheprogrammingmodelof8085microprocessor[2]* 11. Towritetypesofinstructionsbasedonthesize.[1]* 12. Todescribetypesofinstructionsandgivingexamplesofeach.[2]* 13. Todescribevariousaddressingmodesof8085microprocessorandgivingexamplesofeach.[2]* 14. Todescribevariousdatatransferinstructionsof8085microprocessorandgivingexamplesofeach.[2]* 15. To describe various arithmetic instructions of 8085 microprocessor and giving examplesofeach.[2]* 16. To describe various logical instructions of 8085 microprocessor and givingexamplesofeach.[2]*
			17. To describe various branching instructions of 8085 microprocessor and givingexamplesofeach.[2]* 18. To distinguish between conditional and unconditional jump statements used in8085microprocessor.[4]* 19. To describe various machine control instructions of 8085 microprocessor and givingexamplesofeach.[2]* 20. Toassembleasimpleprogramusing8085instructions.[6]*
		UnitIII Programmingtechniqueswithadditionalinstructions CountersandTimeDelays(NotionalHours:15)	1. Tolistdifferentwaysofmovingdatafrommemorytoaccumulator.[1]* 2. Toassembleprogramsfordatatransfer.[6]* 3. Toexplainvariousrotateinstructionsfor8085microprocessor.[2]* 4. Todistinguishbetweencontinuousloopandconditionalloop.[4]* 5. Toexplaintheworkingofcompareinstructionin8085microprocessor.[2]* 6. Toexplainthegenerationoftimedelayusingregister[2]* 7. Toexplainthegenerationoftimedelayusingregisterpair[2]* 8. Toexplainthegenerationoftimedelayusingloopwithinthelooptechnique[2]* 9. Tocalculatethetimedelayfordifferentloops[4]* 10. Todrawflowchartsforvariousillustrativeprograms.[3]* 11. Towriteprogramsforvariouscounters.[1]*

		UnitIV StacksandSubroutinesCodeConversion,BCDArithmetic,16-bitDataOperations (NotionalHours15)	1. Todefinestack,stackpointerregisteranddescribingtheiruses.[1]* 2. TodiscussthePUSHandPOPinstructions[2]* 3. ToexplaintheexecutionofCALLinstructionsin8085microprocessor[2]* 4. ToexplaintheexecutionofRETinstructionsin8085microprocessor.[2]* 5. TodiscusstheeffectofCALLinstructionsonthestackpointerandprogramcounter[2]* 6. TodiscusstheeffectofRETinstructionsonthestackpointerandprogramcounter.[2]* 7. Todescribeadvancesubroutineconcepts[2]* 8. Todistinguishbetweennestingandmultipleendingsubroutine[4]* 9. TodevelopanassemblylanguageprogramforBCDtoBinaryConversion[6]* 10. TodevelopanassemblylanguageprogramforBinarytoBCDConversion[6]* 11. TodevelopassemblylanguageprogramforBCDtoSeven-SegmentLEDcodeconversion.[6]*
			12. TodevelopassemblylanguageprogramforbinarytoASCIIcodeconversion.[6]* 13. TodevelopassemblylanguageprogramforASCIItobinarycodeconversion.[6]* 14. TodevelopassemblylanguageprogramtocarryoutBCDarithmetic.[6]* 15. Toexplainadvancedinstructionsof8085microprocessor.[2]*
		UnitV SoftwareDevelopmentSystemsandAssemblersInterrupts (Notional Hours15)	1. Todescribeexternalhardwarefeaturesofatypicalsoftwaredevelopmentsystem.[2]* 2. Toexplainutilityprogramsandtheiruses[2]* 3. Todiscussvarioustoolsusedindevelopmentofsoftwareassemblylanguageprograms.[2]* 4. Todescribeassembler,loader/linker,debugger[2]* 5. Tolistanddescribevariousfilesgeneratedinthesystemafterassembling/crossassembling[2]* 6. Tolisttheadvantagesofanassembler/crossassembler[1]* 7. Tolistthesalientfeaturesofassembler.[1]* 8. Tolistandexplaindifferenttypesofassemblers.[1]* 9. Tosummarizevariousinterruptsof8085microprocessor.[2]* 10. Todiscussvariousinterruptsusedby8085microprocessorandtheirpriorities.[2]* 11. Toexplainthestepsof8085microprocessorinterruptprocess.[2]* 12. Toexplaintheworkingofaninterruptin8085microprocessor.[2]* 13. Todescribevectoredinterruptsof8085microprocessor.[2]* 14. ToexplaintheworkingofSIMinstruction[2]* 15. ToexplaintheworkingofRIMinstruction.[2]* 16. Todescriberestartinterrupts.[2]*

		UnitVI ThePentiumandPentiumProcessors Core2andLaterMicroprocessorsSUNSPARC Microprocessor (NotionalHours15)	1. TolistPentiuminstructionsandexplainingtheirfunctions.[1]* 2. ToexplaintheinternalstructureofPentiumproprocessor.[2]* 3. TodiscussthememorymapofPentium2processor.[2]* 4. ToexplaintheCPUIDinstructioninPentiumII[2]* 5. Tocomparebetweeni3,i5andi7processors[4]* 6. TolistthefeaturesofSPARCArchitecture[1]* 7. TolistvariousdataformatsinSPARCArchitecture[1]* 8. TolistfeaturesofspecialPentiumpro[1]* 9. TodescribethePentiumIV[2]*
			10. TodescribePentiumpromicroprocessor[2]* 11. ToexplaininstructionformatsinSPARCmicroprocessor.[2]*
UGIT2P2	MICROPROCESSORARCHITECTUREPRACTICALS	-	1. Todevelopassemblylanguageprogramsrelated tomemoryoperations[6]* 2. Todevelopassemblylanguageprogramsrelatedtoarithmeticandlogicaloperations[6]* 3. Todevelopassemblylanguageprogramsrelatedtopackingandunpackingoperations[6]* 4. Todevelopassemblylanguageprogramsrelatedto registeroperations[6]* 5. Todevelopassemblylanguageprogramsrelatedtomultiplememorylocations[6]* 6. Todevelopassemblylanguageprogramsrelatedtocalculationswithrespecttomemorylocations[6]* 7. Todevelopassemblylanguageprogramsrelatedtomemorylocations[6]* 8. Todevelopassemblylanguageprogramsrelatedtostringoperations[6]* 9. Todevelopassemblylanguageprogramsrelatedtocalculationsonmemorylocations[6]* 10. TodevelopassemblylanguageprogramsrelatedtooperationsonBCDnumbers.[6]*

CourseCode	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT203	WebTechnology	UnitI IntroductiontoXML(NotionalHours:10)	Thelearnerwillbeableto- 1. KnowthebasicconceptofXML.[1]* 2. CompareandcontrastbetweenXMLandHTML[4]* 3. DistinguishbetweenValidandWellformXMLdocument.[4]* 4. SolvetheproblemonXMLDTD.[3]* 5. DescribedifferenttypesofXMLDTD.[2*]

		UnitII XMLSchemas,XSL(NotionalHours:10)	Thelearnerwillbeableto- 1. RecognisethefeaturesofXMLSchema.[2]* 2. ExaminedifferentrestrictioninXMLSchema.[4]* 3. SystematicallydeveloptheXMLSchemafile.[6]* 4. IdentifytheroleofXSLinXML.[2]* 5. SummarizethemechanismofXSLTransform.[2]* 6. DistinguishbetweenCSSandXSL.[4]*
		UnitIII PHP (NotionalHours:10)	Thelearnerwillbeableto- 1. EvaluatetheneedofPHPwithMySOL.[5]* 2. StudythebasicofPHPprogramming.[3]* 3. DistinguishbetweenGETandPOSTMethod.[4]* 4. Studystringmanipulation.[3]*
			5. Performerrorhandling[3]*
		UnitIV AdvancedPHPandMySQL(N otionalHours10)	Thelearnerwillbeableto- 1. StudytheMySQLfunction.[3]* 2. ApplySessionandCookiesintheirWebsite.[3]* 3. GeneratetheWebformtoDatabaseconnectivity.[6]* 4. InfertheneedofRegularExpression.[5]*
		UnitVj Query (NotionalHours10)	Thelearnerwillbeableto- 1. DemonstratethewaysofjQueryimplementation[3]* 2. IdentifydifferentselectorsinjQuery.[3]* 3. DescribethenjQueryEvents.[2]* 4. ApplyjQueryeffectasperthерequirement.[3]* 5. ExaminewhatisperfectTraversingofjQuery[4]*
		UnitVI BootstrapFramework(NotionalHours10)	Thelearnerwillbeableto- 1. RecognisetheneedofBootstrap.[2]* 2. DevelopdifferenttypesofGrid.[6] 3. IllustratetheapplicationofthemeusingBootstrap[3]* 4. IdentifytheuseofCSSRef.andJSRef.[3]* 5. DefineDockersHub.[2]

UGIT2P3	PRACTICAL SESSIONS	-	Thelearnerwillbeableto- 1. WritetheXMLFile.[1]* 2. CreateDTD andXSDforXMLfile.[6]* 3. PerformXSLTransform.[3]* 4. WritePHPcode.[1]* 5. ApplySessionandCookiesintheirWebsite.[3]*
			6. GeneratetheWebformtoDatabaseconnectivity.[6]* 7. Studyhowtoapplyeffect,selectors,eventbyusingjQuery.[1]* 8. DevelopattractivewebpagesbyusingBootstrap[6]*

CourseCode	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT204	Numericaland StatisticalMethods	UnitI MathematicalModelingandEngineeringProblemSolving,ApproximationsandRound-OffErrors,TruncationErrorsandtheTaylorSeries, (NotionalHours:10)	Thelearnerwillbeableto- 1. UnderstandvariousmethodsofMathematical Modeling&Engineeringproblemsolving. 2. Identify&Classifythenumericalproblemtobemodeled. 3. Identificationoferrorsintheexperimentaldata. 4. ApplyTaylorseriestoapproximatefunctionsandestimatetheerrorofapproximation. 5. SolveproblemsonTaylorSeries,ErrorPropagation,TotalNumericalErrors,andFormulationErrors. 6. Familiarwithcalculation&interpretationoferrorsinnumericalmethod.
		UnitII Solutions of Algebraic and Transcendental Equations, Interpolation (NotionalHours:10)	Thelearnerwillbeableto- 1. Understandnumericaltechniquestofindtherootofalgebraic&transcendentalequations. 2. Understandthedifferenceoperators&the

			useofinterpolation. 3. Applynumericalmethodstofindthesolutionofalgebraicequationsusingdifferentmethodsunderdifferentconditions. 4. Applyvariousinterpolationmethods&finitedifferenceconcepts. 5. Estimatingthemissingdatathroughinterpolationmethods. 6. Demonstratetheuseofinterpolation methodstofindintermediatevaluesingiventabulateddata.
		UnitIII Solutionof simultaneous algebraicequations (linear)usingiterativemethods,Numericaldifferentiation &Integration (NotionalHours:10)	Thelearnerwillbeableto- 1. Solvesystemoflinearequationsbyusingitrativemethods. 2. Understand numericaldifferentiation& integration. 3. Workoutnumericaldifferentiation&integrationwhenever&whereverroutinemethodsarenotapplicable.. 4. Apply numericaldifferentiation& integration. 5. Developskillsinanalysingthepropertiesofthefunctionsthroughnumericaldifferentiation &integration.
		UnitIV Numericalsolutionof1stand2ndorderdifferentialequations (NotionalHours10)	Thelearnerwillbeableto- 1. Understandthe1stand2ndorderdifferentialequations 2. Identify1stand2ndorderdifferentialequations. 3. Todifferentiatebetween1stand2ndorderdifferentialequations
			4. Applydifferentnumericalmethodstoobtainsolutionof1stand2ndorderdifferentialequations 5. Solvedifferentialequations. 6. FamiliarwithNumericalsolutionof1stand2ndorderdifferentialequations.

		UnitV Least-SquaresRegression,LinearProgramming(NotionalHours10)	Thelearnerwillbeableto- 1. UnderstandLeast-SquaresRegression,LinearProgramming. 2. Identify&ClassifyLinearProgramming. 3. Fittingofvarioustypesofcurvestotheexperimentaldata. 4. SolvetheproblemsofLeast-SquaresRegression&LinearProgrammingusingformulation&graphicalmethods. 5. Applyconceptofregressioninresultanalysis. 6. Developskillsindesigningmathematical modelsforfittingofcurvestothegivendata.
		UnitVI Randomvariables,Distributions(NotionalHours10)	Thelearnerwillbeableto- 1. UnderstandRandomvariables &Distributions. 2. Identify&Classifydiscrete&continuousrandomvariables&Distributions. 3. SolvetheproblemsofRandomvariables&Distributions. 4. Analyse&evaluaterandomvariables &Distributions. 5. Developskillsindesigningmathematicalmodelsforrandomvariable&distibutions
			tothegivendata.
UGITP204	PRACTICAL SESSIONS	-	Thelearnerwillbeableto- 1. UnderstandnumericalmethodsinSCILAB. 2. Understandstatisticalmethodsfordataanalysis. 3. Writeprogramstosolveexamplesbyusingvariousnumerical&statisticalmethods. 4. Familiarwithprogrammingwith numerical&statisticalmethodspackageslike SCILAB. 5. ImplementnumericalmethodsinSCILAB.

Course Code	**Course Title**	**Unit title**	**Learning Outcomes**

UGIT205	Professional Skills and Green Computing	Unit I The Seven Cs of Effective Communication,Understanding Business Communication (Notional Hours: 12)	The leaner will be ableto 1. Know the seven C's of effective communication and Define Communication[2]* 2. Describe different characteristic and principles of communication[2]* 3. Diagrammatically explain process and component of communication[4]* 4. Categories different type of communication[4]* 5. Use different non-verbalmeans of communication[3]* 6. Describe different means of Technology-enabled communication.[2]*
		Unit II Writing Business Messages and Documents, Campus to corporate program, Developing Oral Communication Skills for Business (Notional Hours: 12)	The leaner will be ableto 1. Write a business message[1]* 2. Compare types and approaches of business message[4]* 3. Describe principle ofeffective business correspondence[2]* 4. Implement campus to corporate changes.[3]* 5. Compare different types of business proposals.[4]* 6. Construct written instruction, reports, resume, business proposals[6]*
		Unit III Developing Oral Communication Skills for Business, Understanding Specific Communication Needs, PresentationProcess (Notional Hours:12)	The leaner will be ableto 1. Distinguish between different types of meetings and conferences[4]* 2. Demonstrate group discussion and team presentation[3]* 3. PerformCrisis management[3]* 4. Describe persuasive business strategy, AIDA, conflict management strategy[2]* 5. Apply ethics in business.[3]* 6. Prepare presentation[6]*
		Unit IV Overview and Issues in green computing, Initiatives and Standards (Notional Hours:12)	The leaner will be ableto 1. Know Green computing[1]* 2. Measure carbon footprint[5]* 3. Apply Green IT for cost saving and power consumption[3]* 4. Discuss different global initiatives[2]*

		UnitV MinimizingPower Usage, Cooling (Notional Hours:12)	The leaner will be ableto 1. Recognise power problems.[2]* 2. Monitor power consumption[5]* 3. Discuss low cost solutions for checking power[2]* 4. Describe different means for reducing power consumption[2]* 5. Calculate cooling need[5]* 6. Determine different ways to reduce cooling cost[5]*
		Unit VI Going Paperless, Greening Your Information Systems, Staying Green (Notional Hours:12)	The leaner will be ableto 1. Recognise paper problem[2]* 2. Describe going paperless, paperless billing, intranet and its components, EDI[2]* 3. Selecting metrics to calculate power consumption before and after following green practice[5]* 4. Determine BI tools to measure and track data[5]*
			5. Categories groups in CRM [5]* 6. Describe chief green officer, SMART goals, helpful organization in achieving green
UGIT2P5	Practical	-	The leaner will be able to 1. Improve interpersonal communication and social skills.[6]* 2. Overcome stage fright and enhance confidence.[6]* 3. Improving presentation skillsand interview skills. [6]* 4. Learn and practice listening, reading,writingand speaking skills.[3]* 5. Demonstrate positive group communication.[3]* 6. Choose eco-friendly hardware and software[5]* 7. Recycle the material toincrease the product's life[6]* 8. Apply all the above knowledge in real life.[3]*

Course Code	**CourseTitle**	**Unittitle**	**LearningOutcomes**

UGIT206	LifeAndEmployabilitySkills	UnitICommunication skill(NotionalHours: 10)	Thelearnerwillbeableto- 1. Understandtheimportanceandtypeofcommunicationinpersonalandprofessionalenvironment.[2]* 2. Explaintheprocessofcommunication.[2]* 3. CompareandcontrastbetweenFormalandinformalcommunication.[4]* 4. Illustratethenon-verbalcommunication.[3]* 5. ExplaintheimportanceofListening.[2]* 6. Understandtheconceptof training.[2]*
		UnitII PresentationSkills&InteractiveSkills(NotionalHours:10)	Thelearnerwillbeableto- 1. UnderstandthePresentationProcess.[2]* 2. Explainplanningthepresentation.[2]* 3. CompareandcontrastbetweenMindMapandConceptMap.[4]* 4. UnderstandChunkingTheory.[2]* 5. UnderstandhowtoImpressingtheAudience.[2]* 6. ExplainthetipsforFacingInterviews.[2]*
		UnitIII Entrepreneurshipand	Thelearnerwillbeableto-
		marketskill (NotionalHours:10)	1. UnderstandtheImportanceofEntrepreneurship.[2]* 2. IllustrateEntrepreneurs.[3]* 3. Explainprojectpreparationsteps.[2]* 4. UnderstandtheMarketsill.[2]* 5. ExplaintheSupportandprocurement.[2]*
		UnitIV ProductivityinIndustries (NotionalHours10)	Thelearnerwillbeableto- 1. Explaintheconceptofproductivity.[2]* 2. Comparisonwithproductivity-thedevelopedcountries.[4]* 3. SummarisetheQualityTools.[2]* 4. SchematicallyrepresentQualityCircles.[4]* 5. Understandtheimportanceofgoodhousekeeping.[2]*

		UnitV OccupationalSafetyand Hazard (NotionalHours10)	Thelearnerwillbeableto- 1. ExplainOccupationalSafety.[2]* 2. UnderstandtheHealthHazard.[2]* 3. SummarisetheCausesofIndustrialAccidents.[2]* 4. ComparethemachinefactorsandNon-MachineFactorsaccidents.[4]* 5. Understandthesafetyinindustries.[2]* 6. UnderstandtheLabourwelfarelegislation,[2]*
		UnitVI Environmental awareness (NotionalHours10)	Thelearnerwillbeableto- 1. UnderstandtheEnvironmentaleducation.[2]* 2. ExplaintheimportanceofEnvironmentaleducation.[2]* 3. SchematicallyrepresentGlobalWarming.[4]* 4. ExplainEnvironmentalPollution.[2]*
			5. Summarisetheair,water,noise,soilpollution.[2]*
UGIT2P6	LIFEANDDEMPLOYABILITYSKILLSPRACTICALS	-	Thelearnerwillbeableto: 1. Toskimformainideas[2*] 2. Tosummarizeandparaphraseoralcomprehensionintotext.[2*] 3. Makeinferencesaboutthespokendiscourse[4*] 4. Totakenotesfromthespokendiscourse[1*. 5. Toanswerquestionsbasedonthespokendiscourse/oralcomprehension.[3*] 6. Togiveanoralpresentationusingeffectivedeliverystrategies[6*] 7. Toengageintoclass/groupdiscussions[5*]

Course Code	**Course Title**	**Unit title**	**Learning Outcomes**
UGIT301	Core Java	Unit I Introduction, Data types and Operators, String Handling, Arrays (Notional Hours: 12)	The leaner will be ableto 1. Know about java class file, JRE, JVM, JDK and basics in java[1]* 2. Develop basic java program[6]* 3. Discuss different data type and operators in java[2]* 4. Solve the example of operator[3]* 5. Distinguish between String class and StringBuffer class[4]* 6. Illustrate arrays[3]*

		Unit II Control flow Statements, Iterations, Classes(Notional Hours: 12)	The leaner will be ableto 1. Demonstration of decisionmaking statement[4]* 2. Demonstration of looping statement[4]* 3. Identify classes , objects, members of class and relationships among them needed for a specific problem[2]* 4. Describe abstract classes and methods, constructor, this keyword, super keyword, static keyword and garbage collection[2]*
		Unit III Inheritance, Packages (Notional Hours:12)	The leaner will be ableto 1. Implementation of inheritance[3]* 2. Apply this and super keyword[3]* 3. Define and use interfaces[3]* 4. Creating packages[6]*
			5. Using packages[3]*
		Unit IV Multithreading, Exceptions, Byte Streams (Notional Hours:12)	The leaner will be ableto 1. Discuss multithreading[2]* 2. Diagrammatic explanation ofthread life cycle[4]* 3. Implementation of exception handling mechanism[3]* 4. Discuss about byte stream[2]* 5. Create a programto performoperation on file[6]*
		UnitV Event Handling, Abstract Window Toolkit, Layouts (Notional Hours:12)	The leaner will be ableto 1. Recognise the need ofevent handling[2]* 2. Discuss event classes, event listener interface[2]* 3. Develop programusing AWT[6]* 4. Implementation of differentlayouts in AWT[3]*
		Unit VI Applet, JDBC (Notional Hours:12)	The leaner will be ableto 1. Diagrammatically explain applet life cycle[4]* 2. Discuss applet html tags[2]* 3. Generate java application using applet[6]* 4. Generate java application for database connectivity[6]*

UGIT3P1	Practical	-	The leanerwill be ableto 1. Generate java basic program[6]* 2. Use different operator[3]* 3. Use different data type[3]* 4. Implement concept of constructor[3]* 5. Implement concept of inheritance[3]* 6. Use of packages and arrays[3]* 7. Implementation of exception handling and multithreading[3]* 8. Generate java application to perform operation on file[6]* 9. Develop java mini project[6]*

CourseCode	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT302	AppliedMathematics	Unit–IMatrices (NotionalHours:10)	Thelearnerwillbeableto- 1. Understanddefinitionofamatrix&varioustypesofmatrices. 2. Performthematrixoperationsofaddition,multiplicationandtranspositionandexpressasystemofsimultaneouslinearequationsinmatrixform. 3. Findthetranspose,inverseandeigenvaluesand eigenvectorsofamatrix. 4. Distinguishbetweenhomogeneousandnonhomogeneoussystems. 5. Determinewhenasystemoflinearequationshasno,one,or manysolutions. 6. Findtherankofmatrices&analysethem.
		Unit–II ComplexNumbers(NotionalHours:10)	Thelearnerwillbeableto- 1. Understandthegeometricinterpretationofcomplexnumbersand Knowmethodsoffindingthenthrootsofcomplexnumbers. 2. Investigatearithmeticwithcomplexnumbers$\mathbb{C}$inrectangularforma+ib. 3. Writecomplexnumbersinpolarform. 4. UseDeMoivre'stheoremtofindtherootsofcomplexnumbers.
			5. Calculatethesums,products,quotients,conjugate,modulus,andargumentofcomplexnumbers. 6. DiscussandillustratesymmetriesandrotationsonanArganddiagram.

		Unit–III Equationofthefirstorderandofthefirstdegree,Differentialequationofthefirstorderofadegreehigherthanthefirst,LinearDifferentialEquationswithConstantCoefficients. (NotionalHours:10)	Thelearnerwillbeableto- 1. UnderstandthedifferentialequationofthefirstorderofadegreehigherthanthefirstandLinearDifferentialEquationswithConstantCoefficients. 2. Identifythedifferentialequations. 3. Learnvarioustechniquesofgettingexactsolutionsofcertainsolvablefirstorderdifferentialequationsandlineardifferentialequationsofsecondorder. 4. Solvefirstorderdifferentialequationsutilizingthestandardtechniquesforseparable,exact,linear,homogeneous,orBernoullicases. 5. Findthecompletesolutionofanonhomogeneous differentialequationasalinearcombinationofthecomplementaryfunctionandaparticularsolution. 6. Developskillsinanalysingthedifferentialequations throughdifferentevaluationmethods.
		UnitIV TheLaplaceTransform,InverseLaplaceTransform (NotionalHours10)	Thelearnerwillbeableto- 1. UnderstandtheLaplaceandInverseLaplaceTransform. 2. FindtheLaplacetransformoftheexponential,cosineandsinefunctions. 3. DetermineLaplacetransformsandinverseLaplacetransformsofvariousfunctions. 4. SelectandusetheappropriateshiftingtheoremstofindLaplaceandinverseLaplacetransforms 5. ApplytheConvolutionTheoremtoobtaininverse Laplacetransforms. 6. DevelopskillsinanalysingtheLaplace&inverse
			LaplaceTransform.
		UnitV MultipleIntegrals,Applicationsofintegration(NotionalHours10)	Thelearnerwillbeableto- 1. Understandmultipleintegralsandapplicationofintegration. 2. Identify&classifythedouble,tripleandmultipleintegrals. 3. EvaluateamultipleintegralsoverarectangularregionbywritingitasaniteratedintegralandChangetheorderofintegrationforagivendoubleintegral. 4. Useadoubleintegraltocalculatetheareaofaregion, volumeunderasurface,oraveragevalueofafunctionoverplaneregion. 5. Writeamultipleintegraltoevaluatetheareaofagivenregion,volumeofagivensolid. 6. Demonstratebasicknowledgeofmultipleintegrals&application ofintegration.

		UnitVI BetaandGammaFunctions,DifferentiationUndertheIntegralSign,ErrorFunctions(NotionalHours10)	Thelearnerwillbeableto- 1. UnderstandBetaandGammaFunctions. 2. Identify&ClassifyBetaandGammaFunctions. 3. UseBetaandGammafunctionstoevaluateintegrals. 4. SolvetheproblemsbasedonBetaandGammaFunctions,DifferentiationundertheIntegralSign,ErrorFunctions. 5. Familiarwithcalculation&interpretationofdifferentiationundertheIntegralSign&errorfunctions
UGITP302	PRACTICAL SESSIONS	-	Thelearnerwillbeableto- 1. Understandthedifferentformulae'sandmethodsofmathematics. 2. Identify,formulateandsolvemathematicalproblemsbasedonmatrices,complexnumbers,differentialequations,transformations,multipleintegrals,Beta&Gammafunctions&errorfunctions.
			3. Communicatemathematicalknowledgeandlearningependently. 4. Developtheabilitytosolvecomplex,difficult,andintractableproblemsandcreateeffectiveandinnovativesolutions. 5. Applymathematicalconceptsandtheoremtosolvetheproblems. 6. Examineandevaluatetheimplementationofsolutionstoproblems.

CourseCode	**CourseTitle**	**Unittitle**	**LearningOutcomes**

UGIT303	LinuxSystem Administration	UnitI **IntroductiontoRedHatEnterpriseLinux:**Linux,OpenSourceandRedHat,OriginsofLinux,Distributions,DutiesofLinuxSystemAdministrator.**CommandLine:**WorkingwiththeBashShell,GettingtheBestofBash,UsefulBashKeySequences,WorkingwithBashHistory,PerformingBasicFileSystemManagementTasks,Workingwith Directories,PipingandRedirection,FindingFiles **SystemAdministrationTasks:**PerformingJobManagementTasks,SystemandProcessMonitoringandManagement,ManagingProcesseswithps,SendingSignalstoProcesseswiththekillCommand,usingtoptoShowCurrentSystemActivity,ManagingProcessNiceness,SchedulingJobs,MountingDevices,WorkingwithLinks,CreatingBackups,ManagingPrinters,SettingUpSystemLogging,SettingUpRsyslog,CommonLogFiles,SettingUpLogrotate	Thelearnerwillbeableto- 1. Demonstrateof InstallandconfiguretheLinuxoperatingsystem[2*] 2. Describethefundamentalsofsystemadministration[1*] 3. Outlinethetasksofasystemadministrator. 4. understandthebasiccommandsoflinuxoperatingsystemandcanwriteshellscripts[2*] 5. SummarisingthehistoryofBashShell.[2*] 6. Recognisingofdifferent systemadministrationtask[1*] 7. Studyofseveralcommandformanaging processesandsystemdevices.[3*] 8. Analysingdifferentlogsettings[3*] 9. UnderstandingdifferentaspectsofManagingsoftwareoflinux[2*]
		ManagingSoftware:UnderstandingRPM,UnderstandingMetaPackageHandlers,CreatingYourOwnRepositories,ManagingRepositories,InstallingSoftwarewithYum,QueryingSoftware,ExtractingFilesfromRPMPackages (NotionalHours:15)	

UGIT303	**ConfiguringandManagingStorage**	UnitII **ConfiguringandManagingStorage:**UnderstandingPartitionsandLogicalVolumes,CreatingPartitions,CreatingFileSystems,FileSystemsOverview,CreatingFileSystems,ChangingFileSystemProperties,CheckingtheFileSystemIntegrity,MountingFileSystemsAutomaticallyThroughfstab,WorkingwithLogicalVolumes,CreatingLogicalVolumes,ResizingLogicalVolumes,WorkingwithSnapshots,ReplacingFailingStorageDevices,CreatingSwapSpace,WorkingwithEncryptedVolumes **ConnectingtotheNetwork:**UnderstandingNetworkManager,WorkingwithServicesandRunlevels,ConfiguringtheNetworkwithNetworkManager,Workingwithsystem-config-network,NetworkManagerConfigurationFiles,NetworkServiceScripts,NetworkingfromtheCommandLine,TroubleshootingNetworking,SettingUpIPv6,ConfiguringSSH,EnablingtheSSH	Thelearnerwillbeableto- 1. Constructingthestorage forfilesystem[6*] 2. Understandingtheconceptofmemorypartition.[2*] 3. Studyandconstructing differentpartitionforlinuxfilesystem[3*,6*] 4. Understandingtheservicesandrunlevelofnetworkmanager[2*] 5. Executingtheconfigurationfileandservice scriptoncommandline [3*] 6. Understanding,configuringandexecutingofSSHclient/Server [2*.3*] 7. StudyofUser,Groupanditspermission[3*]. 8. Classifyingand creatinguser,andgroupsinLinuxsystem.[2*,6*]
		Server,UsingtheSSHClient,UsingPuTTYonWindowsMachines,ConfiguringKeyBasedSSHAuthentication,UsingGraphicalApplicationswithSSH,UsingSSHPortForwarding,ConfiguringVNCServerAccess. **WorkingwithUsers,Groups,andPermissions**:ManagingUsersandGroups,CommandsforUserManagement,ManagingPasswords,ModifyingandDeletingUserAccounts,ConfigurationFiles,CreatingGroups,UsingGraphicalToolsforUser,andGroupManagement,UsingExternalAuthenticationSources,theAuthenticationProcess,sssd,nsswitch,PluggableAuthenticationModules,ManagingPermissions,theRoleofOwnership, BasicPermissions: Read,Write,andExecute,AdvancedPermissions,WorkingwithAccessControlLists,SettingDefaultPermissionswithumask, WorkingwithAttributes (NotionalHours:15)	

UGIT303	**SecuringServerwithiptables**	UnitIII **SecuringServerwithiptables:**UnderstandingFirewalls,SettingUpaFirewallwithsystem-config-firewall,AllowingServices,TrustedInterfaces,Masquerading,ConfigurationFiles,SettingUpaFirewallwithiptables,Tables,Chains,andRules,CompositionofRule,ConfigurationExample,AdvancediptablesConfiguration,ConfiguringLogging,TheLimitModule,ConfiguringNAT **SettingUpCryptographicServices:**Introducing	Thelearnerwillbeableto- 1. Understandingfirewallsforsecuringserverwithiptable[2*] 2. Constructing iptableusingfirewall[6*] 3. AnalyzetheneedforsecuritymeasuresforaLinux environment.[3*] 4. Studyandconstruct**Cryptographic ServicesusingSSL[3*6*]** 5. Studyandconstructionofnetworkfileserver(NFS)[3*6*]
		SSL,ProofofAuthenticity:TheCertificateAuthority,ManagingCertificateswithopenssl,CreatingaSigningRequest,WorkingwithGNUPrivacyGuard,CreatingGPGKeys,KeyTransfer,ManagingGPGKeys,EncryptingFileswithGPG,GPGSigning,SigningRPMFilesConfiguring **ServerforFileSharing**:WhatisNFS?AdvantagesandDisadvantagesofNFS,ConfiguringNFS4,SettingUpNFSv4,MountinganNFSShare,MakingNFSMountsPersistent,ConfiguringAutomount,ConfiguringSamba,SettingUpaSambaFileServer,SambaAdvancedAuthenticationOptions,AccessingSambaShares,OfferingFTPServices (NotionalHours:15)	
UGIT303	**ConfiguringDNSandDHCP**	**UnitIV** **ConfiguringDNSandDHCP**:IntroductiontoDNS,TheDNSHierarchy,DNSServerTypes,TheDNSLookupProcess,DNSZoneTypes,SettingUpaDNSServer,SettingUpaCache-OnlyNameServer,SettingUpaPrimaryNameServer,SettingUpaSecondaryNameServer,UnderstandingDHCP,SettingUpaDHCPServer **SettingUpaMailServer**:UsingtheMessageTransferAgent,theMailDeliveryAgent,theMailUserAgent,SettingUpPostfixasanSMTPServer,WorkingwithMutt,BasicConfiguration,InternetConfiguration,ConfiguringDovecotforPOPandIMAP	Thelearnerwillbeableto- 1. SummarisingHierarchyandseveraltypesofDNSServer.[2*] 2. DesigningCache-Only,primaryand secondaryNameServer[6*] 3. UnderstandinganddesigningDHCPServer[2*6*] 4. StudyofDifferentMailAgentforMailserver[3*] 5. Constructing MailserverusingHTTP,SMTP,POPandIMAP [6*]

		(NotionalHours15)	
UGIT303	**ConfiguringApacheonRedHatEnterpriseLinux**	UnitV **ConfiguringApacheonRedHatEnterpriseLinux:**ConfiguringtheApacheWebServer,creatingaBasicWebsite,UnderstandingtheApacheConfigurationFiles,ApacheLogFiles,WorkingwithVirtualHosts,SecuringtheWebServerwithTLSCertificates,ConfiguringAuthentication,SettingUpAuthenticationwith.htpasswd,ConfiguringLDAPAuthentication,SettingUpMySQL **IntroducingBashShellScripting**:Introduction,ElementsofaGoodShellScript,ExecutingtheScript,WorkingwithVariablesandInput,UnderstandingVariables,Variables,Subshells,andSourcing,WorkingwithScriptArguments,AskingforInput,UsingCommandSubstitution,SubstitutionOperators,ChangingVariableContentwithPatternMatching,PerformingCalculations,UsingControlStructures,Usingif...then...else,Usingcase,Usingwhile,Usinguntil,Usingfor,ConfiguringbootingwithGRUB. (NotionalHours15)	Thelearnerwillbeableto- 1. Understanding andconstructing ApacheonRedHatEnterpriseLinux[2*6*] 2. CreatingAuthenticationwith.httppasword [6*] 3. Understanding ofdifferentaspect**BashShellScripting[2*]** 4. Explainingtheelement ofgoodshell script[2*] 5. Analysetheworkingof Argument,Input ,Operatorsinshellscripting[4*] 6. Studyand designing scriptsusingcontrolstructure[3*6*] 7. Understandingandconstructbootingwith GRUB[2*6*]8.
UGIT303	**High-AvailabilityClustering**	**UNITVI** **High-AvailabilityClustering:**High-AvailabilityClustering,TheWorkingsofHighAvailabil	Thelearnerwillbeableto-

		AvailabilityRequirements,RedHatHigh-Availability Add-onSoftware,Components,ConfiguringCluster-BasedServices,SettingUpBonding,SettingUpSharedStorage,InstallingtheRedHatHighAvailabilityAdd-On,BuildingtheInitialStateoftheCluster,ConfiguringAdditionalClusterProperties,ConfiguringaQuorumDisk,SettingUpFencing,CreatingResourcesandServices, TroubleshootingaNonoperationalCluster,ConfiguringGFS2File **SystemsSettingUpanInstallationServer**:ConfiguringaNetworkServerasanInstallationServer,SettingUpaTFTPandDHCPServerforPXEBoot,InstallingtheTFTPServer, ConfiguringDHCPforPXEBoot,CreatingtheTFTPPXEServerContent,creatingaKickstartFile,UsingaKickstartFiletoPerformanAutomated,Installation,ModifyingtheKickstartFilewith,system-config-kickstart,MakingManualModificationstotheKickstartFile(NotionalHours15)	1. Understanding workingand RequirementsofRed–HatHigh-AvailabilityClustering[2*] 2. StudyofAdd-onsoftware and clusterbasedservicesinRedHatHigh-Availabilityclustering[3*] 3. UnderstandingTroubleshootingaNonoperationalClusterand creatingResourcesandServices,[2*6*] 4. AnalysingandConstructingNetworkServerasanInstallationServer[4*6*]

Course Code	**Course Title**	**Unit title**	**Learning Outcomes**
UGIT304	Database Managment System	Unit I Introduction to Databases and Transactions,Data Models (Notional Hours: 12)	The leaner will be ableto 1. Know about data,information,database,Databasemanagement system[1]* 2. Understand advantages of DBMS [2]* 3. Discuss difference between file base systemand DBMS[2]* 4. Understand importance of data model[2]*
		Unit II DatabaseDesign,ER Diagramand Unified Modeling Language Relational database model(Notional Hours: 12)	The leaner will be ableto 1. Demonstration of ER Model[4]* 2. Demonstration of ER Symbol with exanple[4]* 3. Understand Codd's rules [2]*

		Unit III Relational Algebra and Calculus Relationalalgebra: Calculus(Notional Hours:12)	The leaner will be ableto 1. Understand Relational Algebra and Calculus.[2] 2. Understand tuple and domain relational calculus.[2] 3. Implementation of relational algebra[3]*
		Unit IV **Constraints, Views and SQL** (Notional Hours:12)	onstraints, types of constrains, Integrity constraints, Views: Introductiontoviews,dataindependence,security, updateson views,comparison between tables andviews SQL:data
			definition, aggregate function, Null Values, nested sub queries, Joined relations. Triggers. The leaner will be ableto 1. Discuss Constraints and types of Contraints[2]* 2. Diagrammatic explanation ofthread life cycle[4]* 3. Implementation of all types of contraints[3]* 4. Understandintegrityconstraints[2]* 5. Creatingtable with different type of constaints[6]* 6. Understand database view [2]* 7. Understand difference between viewand table[2] 8. Creating database view and dropping database view.
		UnitV Transaction managementand Concurrency (Notional Hours:12)	The leaner will be ableto 1. Study of ACID properties of transaction[2]* 2. Discuss serializability and concurrencycontrol [2]* 3. Discuss Develop Lockbasedconcurrency control (2PL,Deadlocks)[2]* 4. Discuss Time stamping methods, optimistic methods[2]* 5. Discuss database recovery management.[2]*

		Unit VI PL-SQL**:** (Notional Hours:12)	BeginningwithPL/SQL,Identifiers and Keywords, Operators, Expressions, Sequences,Control Structures, Cursors and Transaction,Collections and composite data types, procedures Functions, Exceptions Handling,Packages,With Clause and Hierarchical Retrieval,Triggers.
			The leaner will be ableto 1. Diagrammatically explain PL/SQL block Structure[4]* 2. Discuss Control structure in PL/SQL[2]* 3. Discuss Cursor and types of cursor 4. Implement cursor[6]* 5. Discuss Procedure and function [2]* 6. Implement Stored Procedure and Function[6]
UGIT3P4	Practical	-	The leanerwill be ableto 1. To execute and verify the Data Definition Language commands and constraints[5]* 1. To execute and verify the DML and TCL Language commands[5]* 2. To study the usage of various Data Control Language commands.[2]* 2. To execute and verify the SQL commands for Views. [5]* 3. To study and verify the SQL set operator. [2]* 4. To study and verify the group by and enhancement in group by clause. [2]* 5. Solve Query by considering table. [3]* 6. To Study Advancedsubquery. 7. Write the pl/sql programto find addition of two number. [2]* 8. To study PL/SQL controlstructure.

			10. To study function in PL/SQL. [2]* 11. To study and execute PL/SQL trigger[5]* 12. To study and execute PL/SQL cursor. [5]* 13. To study and execute PL/SQL exception. [5]*

CourseCode	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT305	DataStructure	UnitIIntroductionArray (NotionalHours:12)	Thelearnerwillbeableto- 1. Distinguishbetweenprimitive,non-primitiveandabstractdatatypeandrevisetheconceptofArray.[1]* 2. RecognizethemeaningoftheAlgorithmanditsdifferentnotation.[2]* 3. Performingvariousoperationsonthearray.[3]* 4. Writingdifferentalgorithmstoperformdifferentoperationsofdatastructurebyusingtheconceptofthearray.[4]* 5. Findingtheeasiestsolutionfromthebunchofalgorithmsofdata structureoperation.[5]* 6. Applytheknowledgetosolvehigher-orderthinkingquestions.[5]*
		UnitIILinkedList (NotionalHours:12)	Thelearnerwillbeableto- 1. Knownthemeaningoflinkedlist[1]* 2. Describetheworkingoflinkedlistbyusingmemoryallocationanddeallocation.[2]* 3. Diagrammaticallyandalgorithmicallyexplainvariousoperation performingonlinkedlist.[3]* 4. Distingiushbetweenlinkedlist,circulerlinkedlist,doublelinkedlist,headerlinkedlist.[4]*
		UnitIIIStack	Thelearnerwillbeableto-
		(NotionalHours:6)	1. Givingreallifeexampleofstack[1]* 2. Describingtheworkingofstcakbasedonarrayandlinkedlist.[2]* 3. Applyingstackconceptforfindingarithmeticexpression,matchingparathesisandinfix,prefix,postfixexpression[3]* 4. Algorithmicallyexplainfindingarithmeticexpression,matchingparathesis.[4]* 5. Comparethedifferentmethodofrecursion.[5]*

		UnitIV Queue(NotionalHo urs6)	Thelearnerwillbeableto- 1. Givingreallifeexampleofqueue[1]* 2. Describingtheworkingofqueuebasedonarrayandlinkedlist.[2]* 3. Diagramaticallyexplainingdifferenttypesofqueue[3]* 4. Comparingthedifferenttypesofqueue.[4]*
		UnitV SortingandSearchingTechniques, Tree (NotionalHours12)	Thelearnerwillbeableto- 1. Recallthemeaningofsorting,searchingandtree.[1]* 2. Describingthedifferentwaysofsortingandsearchingbyusingarray,li nkedlistandtree.[2]* 3. Diagrammaticallyandalgorithmicallyexplainsortingandsearchingbyusinga rray,linkedlistandtree.[3]* 4. Diagrammaticallyexplaindifferenttypesoftree.[4]* 5. Comparethedifferentmethodofsortingandsearching.[5]*
		UnitVI HashingTechniques ,Graph (NotionalHours12)	Thelearnerwillbeableto- 1. Recognisemeaningofhashingandrecallmeaningofgraph[1]* 2. Describingworkingofhashingandconceptofgraph.[2]* 3. DiagrammaticallyexplaindifferenthashingmethodsandCollisionresol utionmethod .[3]*
			4. Diagrammaticallyexplaindifferentoperationsperformongraph.[3]* 5. Comparethedifferentmethodofhashing,graphtraversingmethods[5]*.
UGIT3P5	PRACTICAL SESSIONS	-	Thelearnerwillbeableto- 1. Performingsearching,sortingmearging,reversing,matrixoperationsbyusing array.[3]* 2. Performingsearching,sorting,reversingoperationsbyusinglinkedlist.[3]* 3. Perform push,pop,peek, display operation on stack and differentapplicationofstack[3]* 4. Performinsert,delete,displayoperationonqueueandperformcircularqueue, deque.[3]* 5. Performselectionsort,bubblesortandinsertionsort.[3]* 6. Performmergesort,linearsearchandbinarysearch.[3]* 7. Performinfix,prefix,postfixoperationonbinarytree.[3]* 8. Performtheinsertvalueinmaxheapandmeanheap.[3]* 9. Performthecollisiontechniqueandlinearprobing.[3]* 10. Performadjacencymatrixandshortestpathdiagram.[3]*

CourseCode	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT306	SystemSoftware	UnitI **LanguageProcessor.** (NotionalHours:15)	1. ToWriteFundamentalsofLanguageProcessingandlanguageSpecification.[1]* 2. TodefineGrammarandTypesofGrammar.[2]* 3. ToIdentifyToyCompiler.[2]* 4. ToapplyHeapandheapallocation.[3]* 5. Toconstructsortingmethods.[3]*
		UnitII **ScanningandParsing** (NotionalHours:15)	1. Todefinescanning.[2]* 2. ToexplainFiniteAutomata:DFAandNFA. 3. ToshowConversionofNFAintoDFA.[3]* 4. ToCompareTopDownParsing,BottomupParsing.[4]* 5. TocomputeIntroductiontoLEXandYACCtools.[3]*
		UnitIII **Assemblers** (NotionalHours:15)	1. ToDiscussElementsofAssemblyLanguageProgramming.[2]* 2. ToapplySimpleAssemblyLanguageScheme.[3]* 3. ToconstructPassStructureofAssembler.[3]* 4. TocompareDesignofTwoPassAssembler.[4]*
		UnitIV **MacroProcessors**(NotionalHours15)	1. ToDefineMacroDefinitionandCall.[2]* 2. ToExplainMacroExpansion,NestedMacroCalls.[2]* 3. TodetermineAdvancedMacroPreprocessor.[4]* 4. ToconstructDesignofMacroPreprocessor.[3]* 5. TocompareSinglePassAlgorithm,TwoPassAlgorithm.[4]* 6. TojustifyMacroCallswithinMacroCalls.[5]*
		UnitV **LoaderandLinkers,IntroductiontoCompilers** (NotionalHours15)	1. ToidentifyRelocationAndLinkingConcept.[2]* 2. ToconstructDesignofaLinker.[3]* 3. ToshowVariousschemesofLoader.[3]* 4. ToexplainAspectsofCompilationandMemoryAllocation.[2]* 5. ToOrganiseCompilationof Expression,CompilationofControlStructure.[4]* 6. TodetermineCodeOptimization,Interpreters.[5]*
		UnitVI **EditorsandDebuggers,DeviceDrivers** (NotionalHours15)	1. TodescribeVarioustypesofEditorsandDebuggersanditsdesign.[2]* 2. Todefinedevicedriver.[2]* 3. ToshowRequirementsofDeviceDriver.[3]* 4. TocategoriesTypesofDeviceDriver.[4]*

CourseCode	**CourseTitle**	**Unittitle**	**LearningOutcomes**

UGIT3P6	PRACTICALSESSIONS	-	1. TousePacketMonitoringsoftware(tcpdump,snort,ethereal)[3]* 2. ToimplementTraceroute,Ping,Finger,Nmap 3. ToshowServerconfiguration(FTP,SMTP,DNS) 4. ToshowNFSConfiguration.[3]* 5. ToimplementFirewallConfigurationusingiptables/ipchains(Linuxonly) 6. ToconductExperimentsusingTurboCAssembler.[3]* 7. ToShowAssignmentsonclass,constructor,overloading,inheritance,overriding.[3]* 8. ToconstructsAssignmentsonwrapperclass,vectors,arrays.[3]* 9. TocomputeAssignmentsondeveloping interfaces-multipleinheritance,extending interfaces.[3]* 10. ToimplementAssignmentsoncreatingandaccessingpackages.[3]* 11. ToconstructAssignmentsonmultithreadedprogramming,handlingerrorsandexceptions,appletprogrammingandgraphicsprogramming.[3]* 12. ToUseofCASEtools.[3]*

CourseCode	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT401	ComputerGraphicsandAnimation.	UnitI IntroductiontoComputerGraphics. (NotionalHours:15)	1. DefinetheconceptofComputerGraphics.[2]* 2. DescribevariousGraphicsDeviceswhichisveryusefulinGraphics.[2]* 3. ExplainingtheworkinganddifferenttypesofcathodeRayTubes.[2]* 4. ToWritetheworkingofLCDDisplays.[1]* 5. DiscussandWritetheAlgorithmsforLineDrawingandCircleDrawing.[2]* 6. ToRecognisetheClippingAlgorithm.[2]*

		UnitII Two- DimensionalTransformati ons(NotionalHours:15)	1. ToParaphrasethe2DTransformations.[2]* 2. ToIdentifyHomogeneousCoordinatesandMatrixRepr esentationof2DTransformations.[2]* 3. Classify2DTransformationinTranslation,Rotation,Scaling,Refle ction,Shear.[2]* 4. ToGiveDiagrammaticallyExplanationofRotationaboutanArbitr aryPoint.[2]* 5. IdentifytheGeometricInterpretationofHomogeneous Coordinates.[2]* 6. ToWriteWindowtoViewportMapping.[1]*
		UnitIII Three- DimensionalTransf	1. ToIdentifythe3DTranslation,Scaling,Rotation,Reflection,Shear transformation.[2]* 2. Apply3DreflectiontoanArbitraryplane.[3]*
		(NotionalHours:15)	3. ToUnderstandthemeaningofAffineandPerspectiveGeometry,Perspe ctiveTransformations.[2]* 4. Toshowtheworkingof VanishingPoints,thePerspectiveGeometryandcameramodels. [3]* 5. DefinethetermProjectionandDrawthesuitablediagramforit. [2]* 6. ToClassifyprojectionintoOrthographicProjectionandObliqueProje
		UnitIVViewin gin3D (NotionalHours15)	1. ToListStagesin3Dviewing.[1]* 2. ToDescribeCanonicalViewVolume(CVV).[2]* 3. ToIllustratecameramodelandviewingpyramid.[3]* 4. ToDiscussRadiometry,Transport,Equation,Photometry.[2]* 5. ToDetermineColorimetry,ColorSpaces,ChromaticAdaptation,Color Appearance.[5]*
		UnitV Visible- SurfaceDeterminatio n(NotionalHours15)	1. ToCategoriesAlgorithmsofVisibleSurface.[4]* 2. DefineBinarySearchPartition(BSP)Tree.[2]* 3. To makeComparisonofVisiblesurfacemethod.[4]* 4. ToIdentifythePlanecurvesandSurfaces.[2]* 5. ToGenerateQuadricSurfacesand BezierSurface.[6]*
		UnitVI ComputerAnimation(NotionalHours15)	1. DefinethetermAnimationandListthePrinciplesofAnimation.[2]* 2. ToExplainKeyframing,Deformations,CharacterAnimation.[2]* 3. ToApplytheAnimationonobjectbyusingProcedural Techniques.[3]* 4. ToComposedifferenceDigitalimagefileformats.[6]* 5. ToConstructtheHistogramsforDigitalimageenhancementandcontras tstretching.[6]* 6. ToImprovesmoothingandmedianFilteringof Image Processing.[6]*

CourseCode	CourseTitle	Unittitle	LearningOutcomes
UGIT4P5	PRACTICALSESSIONS	-	1. Toimplementthebasicfunctionsused forgraphicsinC/C++/PythonLanguage.[3]* 2. ToDrawaCo-ordinateaxisatthecenterofthescreen.[3]* 3. ToDrawsimpleHutonthescreen.[3]* 4. ToDrawthefollowingbasicshapesinthecenterofthescreen-Circle,Rectangle,Square,Ellipse,Line.[3]* 5. ImplementtheprogramforDDAand BresenhamslineDrawingAlgorithm.[3]* 6. ImplementtheprogramforMidPointCircleDrawingalgorithm.[3]* 7. ProgramtoImplement2DScalingand2Dtranslation.[3]* 8. Implement2DrotationonagivenObject.[3]* 9. ProgramtoimplementCohen-SutherlandclippingAlgorithm.[3]* 10. Implementaprogramtofillcircleusingfloodfillandboundaryfillalgorithm.[3]* 11. TodrawSmilingfaceusingAnimationandMovingcaronScreen.[3]*

Course Code	CourseTitle	Unittitle	LearningOutcomes
UGIT402	Embedded System	UnitI Introduction,Characteristicsandqualityattributesofembeddedsystems(NotionalHours: 6)	Thelearnerwillbeableto- 1. Describingthe embeddedSystemsandgeneralpurposecomputersystems.[1]* 2. Identifyclassifications,applicationsandpurposeofembeddedsystems.[2]* 3. ExplainingCharacteristicsof EmbeddedSystems.[2]* 4. DiscussoperationalandnonoperationalqualityattributesofEmbe

		UnitII Coreofembeddedsystems,EmbeddedSystems–ApplicationandDomainSpecific (NotionalHours:12)	Thelearnerwillbeableto- 1. RecalltheMicroprocessorsandmicrocontrollers.[1]* 2. ExplainingRISCandCISCcontrollers,BigendianandLittleendian processors[2]* 3. DescribingtheApplicationspecificICs,Programmablelogicdevices,COTS,sensorsandactuators,communicationinterface,embeddedfirmware,othersystemcomponents[1]* 4. UsetheApplicationspecific–washingmachine,domainspecific–automotivesystemtoudersandtheworkingofembeddedsytem[4]*
		UnitIII Embedded Hardware,Peripherals	Thelearnerwillbeableto-
		(NotionalHours:6)	1. RecallMemorymap,i/omap,interruptmap[1]* 2. Identifyuseandevaluatethememory–RAM,ROM,typesofRAMandROM[2]* 3. Understandtheprocessmanagementpoliciesandschedulingofprocessesby CPU[2]* 4. Recognisethemeaningmemorytesting,CRC,Flash memory.[2]* 5. SolvevariousproblembasedonChecksumand CRCmethodforerrorcorrection.[3]* 6. DefinetheuseofDeviceDriver,TimerDriver-WatchdogTimers.[2]*
		UnitIV The 8051Microcontrollers,8051ProgrammminginC (NotionalHours12)	Thelearnerwillbeableto- 1. ListingMicrocontrollersandEmbeddedprocessors,Overviewof 8051family.[1]* 2. Explainginguse8051Microcontrollerhardware,ExternalMemory.[2]* 3. DiagrammaticallyexplainInput/outputpins,Ports,andCircuits.[2]* 4. DicussonDataTypesandtimedelayin8051C.[2]* 5. UnderstandtheI/OProgramming,Logicoperations,DataconversionPrograms.[2]* 6. Applytheknowledgetocreatetimedelayinembedded Cprogramming.[3]*

		UnitV DesigningEmbeddedSystemwith8051Micro-controller,Programmingembeddedsystems (NotionalHours12)	Thelearnerwillbeableto- 1. RecognisetheFactorstobeconsideredinselectingacontroller.[2]* 2. Illustratethewhy8051Microcontrollerispopular.[3]* 3. Identifythedesigningwith8051.[2]*
			4. Understandthestructureofembeddedprogram.[2]* 5. Explainingtheinfiniteloop,compiling,linkinganddebugging.[2]* 6. Applytheknowledgetowriteaembedded C programming.[3]*
		UnitVI RealTimeOperatingSystem(RTOS),DesignandDevelopment(NotionalHours12)	Thelearnerwillbeableto- 1. RecallthemeaningOperatingsystembasics,typesofoperatingsystems.[1]* 2. DescribingtheReal-TimeCharacteristics,SelectionProcessofanRTOS.[2]* 3. Understandembeddedproductdevelopmentlife-cycle.[2]* 4. Dicussontrendsinembeddedindustry.[2]*
UGIT3P5	PRACTICAL SESSIONS	-	Thelearnerwillbeableto- 1. PerformingDesignandDevelopmentareprogrammableembedded computerusing8051microcontrollersandtoshowthefollowingaspects. a. Programming b. Execution c. Debugging2.[3]* 2. Performimplementselevatorsimulator.[3]* 3. Performinterfacesteppermotorwith8051andwriteaprogram tomovethemotorthroughagivenangleinclockwiseorcounter clockwisedirection.[3]* 4. Performgeneratetrafficsignal.[3]* 5. PerforminterfacingProgramforMatrixKeyboard.[3]* 6. PerforminterfacingLCDDisplaywithAT89S52.[3]*

			squarewaveofgivenfrequencyonoscilloscope.[3]* 8. A]Performinterface8051withD/Aconverterandgeneratetriangularwaveofgivenfrequencyonoscilloscope.[3]* B]PerformusingD/Aconvertergeneratesinewaveonoscilloscopewiththehelpoflookuptablestoredindataareaof8051.[3]*

CourseCode	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT403	ComputerOrientedstatisticaltechniques	UnitI TheMean,Median,ModeandOtherMeasuresofCentralTendency Thestandarddeviationandothermeasuresofdispersion(NotionalHours:15)	1. Understandmean,medianmode[2]* 2. Applymean,medianmode[3]* 3. UnderstandEmpiricalRelationbetweentheMean,MedianandMode 4. DescribevariousGraphicsDeviceswhichisveryusefulinGraphics.[2]* 5. UnderstandTheGeometricMean(G.M.)andHarmonic Mean(H.M.)[2]* 6. UnderstandTherelationBetweenArithmetic,GeometricandHarmonicMeans[3]* UnderstandThestandarddeviationandothermeasuresofdispersion[2]* 7. ApplyThestandarddeviationandothermeasuresofdispersion[3]*
		UnitIIIIntroductiontoR Moments,skewness,and kurtosis (NotionalHours:15)	1. TounderstandR platform anddatatypesandobjects[2]* 2. UsecontrolstructureinR[3]* 3. Understandmoments,Skewness,Kurtosis 4. Applymoments,Skewness,Kurtosis[3]* 5. ExecuteRfunctions[6]*
		UnitIII Elementaryprobabilitytheory(NotionalHours15)	1. UnderstandConditionalProbability,IndependentandDependentEvents,MutuallyExclusiveEvents 2. SolveProblemonUnderstandConditionalProbability,IndependentandDependentEvents,MutuallyExclusiveEvents[3]*
			3. understand ProbabilityDistributions,Mathematical 4. Expectation,RelationbetweenPopulation,SampleMeanandVariance CombinatorialAnalysis,Combinations[3]* 5. Solveproblemonunderstand ProbabilityDistributions,Mathematical [3]* 6. Understand Expectation,RelationbetweenPopulation,Sample MeanandVarianceCombinatorialAnalysis,Combinations[2]*

		UnitIV Elementarysampling Theory Statisticalestimationtheory	1. understandSamplingTheory,RandomSamplesandRandomNumbers,SamplingWithandWithoutReplacement[2]* 2. understandSamplingDistributions 3. ApplySamplingDistribution[3]* 4. UnderstandSamplingDistributionofMeans,SamplingDistributionofProportions,SamplingDistributionofDifferencesandSumsStandardErrors 5. SolveProblemDistributionofMeans,SamplingDistributionofProportions,SamplingDistributionofDifferencesandSumsStandardErrors[5]*
		UnitV Statisticaldecisiont heory (NotionalHours15)	1. UnderstandStatisticalDecisions,StatisticalHypotheses,TestofHypothesesandSignificanceorDecisionRules[2]* 2. SolveProblemonTypeIandTypeIIErrors,LevelofSignificance,TestInvolvingNormal,Distributions;[6]* 3. SolveproblemonTwo-TailedandOne-TailedTests[6]*
		UnitVIStatisti csinR	1. ExecutionofallabovetestinR[5]*

CourseCode	**CourseTitle**	**Unittitle**	**LearningOutcomes**

UGIT4P3	PRACTICALSESSIONS	-	1. UsingRexecutethebasiccommands,array,listandframes.[3]* 2. CreateaMatrixusingRandPerformtheoperationsaddition,inverse,transposeandmultiplicationoperations..[3]* 3. UsingRExecutethestatisticalfunctions:mean,median,mode,quartiles,range,interquartilerangehistogram.[3]* 4. UsingRimportthedatafromExcel/.CSVfileandPerformtheabovefunctions..[3]* 5. UsingRimportthedatafromExcel/.CSVfileandCalculatethestandarddeviation,variance,co-variance..[3]* 6. UsingRimportthedatafromExcel/.CSVfileanddrawtheskewness..[3]* 7. ImportthedatafromExcel/.CSVandperformthehypotheticaltesting..[3]* 8. ImportthedatafromExcel/.CSVandperformtheChi-squaredTest..[3]* 9. UsingRperformthebinomialandnormal distributiononthedata..[3]* 10. PerformtheLinearRegressionusingR..[3]*

Course Code	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT404	SoftwareProjectManagement	UnitI IntroductiontoSoftwareEngineeringandProjectManagement (NotionalHours:10)	Thelearnerwillbeableto- 1. Describedifferentterminologyusedinsoftwareengineering[2]* 2. Determinetheneedforsoftwareprojectmanagement.[5]* 3. Infertheroleofprojectmanager[5]* 4. ListdifferentStakeholderoftheproject.[1]*
		UnitII Projectevaluationandprogrammanagement,SoftwareProcessModel(NotionalHours:10)	Thelearnerwillbeableto- 1. Examinedifferentprojectevaluationtechniques[4]4* 2. Describephaseofsoftwareprocessmodel.[2]* 3. Distinguishdifferentprojectprocessmodelbasedontheirworking,advantagesanddisadvantages.[4]*

		UnitIII ActivityPlanning,RiskManagement, ResourceAllocation(NotionalHours:10)	Thelearnerwillbeableto- 1. ListobjectivesofActivityPlanning.[1]* 2. Designactivitysequenceoftheproject.[6]* 3. Discusspotentialriskinprojectplanning.[2]* 4. PredictpropersequenceofResourceallocation.[5]*
		UnitIV MonitoringandControl,ManagingC ontracts (NotionalHours10)	Thelearnerwillbeableto- 1. ImaginetheprocessofMonitoringProcess.[6]* 2. Inferthesolutionforgettingprojectbacktotarget[5]* 3. Proposetheideatocontroltheprojectifanychangeshappen toscheduleoftheproject.[6]* 4. ListtypesandstagesofContracts.[1]* 5. Paraphrasethedifferenttermsincontract.[2]*
		UnitV ManagingPeopleinSoftwareEnvironments, WorkinginTeams(NotionalHours10)	Thelearnerwillbeableto- 1. Predictwhoistherightpersonforrightjob.[5]* 2. TellwhytheStressManagementisnecessary.[5]* 3. DescribedifferentTeamandOrganizationalbehaviour.[2]* 4. UnderstandtheneedofCommunication.[2]*
		UnitVI SoftwareQuality,ProjectCloseout (NotionalHours10)	Thelearnerwillbeableto- 1. DefinetheSoftwareQuality.[2]* 2. DescribedifferentSoftwareQualityModels.[2]* 3. ListreasonsforProjectCloser.[1]* 4. UnderstandProjectcloserreport.[2]*
UGIT4P4	PRACTICAL SESSIONS	-	Thelearnerwillbeableto- 1. Studyandimplementationofclassdiagrams.[3]* 2. StudyandimplementationofUseCaseDiagrams.[3]* 3. StudyandimplementationofEntityRelationshipDiagrams.[3]* 4. StudyandimplementationofSequenceDiagrams.[3]* 5. StudyandimplementationofStateTransitionDiagrams.[3]*
			6. StudyandimplementationofDataFlowDiagrams.[3]* 7. StudyandimplementationofCollaborationDiagrams.[3]* 8. StudyandimplementationofActivityDiagrams.[3]* 9. StudyandimplementationofComponentDiagrams.[3]* 10. StudyandimplementationofDeploymentDiagrams.[3]*

Course Code	CourseTitle	Unittitle	LearningOutcomes
UGIT405	PythonProgramming	UnitI Introduction,VariablesandExpressions,ConditionalStatements,Controlstatements (NotionalHours:12)	Thelearnerwillbeableto- 1. Distinguishbetweeninteractivemode&scriptmodeinPython.[4]* 2. DistinguishbetweenBrackets,Braces,andParenthesesinPython.[4]* 3. IllustratethetypesofdebugginginPython.[3]* 4. Identifydifferenttypesofvariable.[2]* 5. Illustrateconditionalstatements.[3]* 6. Illustratecontrolstatements.[3]*
		UnitIIFunctions (NotionalHours:6)	Thelearnerwillbeableto- 1. Composeuserdefinedfunctioninpython.[6]* 2. Determinetypeconversionfunction.[5]* 3. Examinedefinition&useoffunctioninpython.[4]* 4. CompareParametersandArgumentsinfunction.[4]* 5. IllustrateFruitfulFunctionsandVoidFunctionsinPython.[3]*
		UnitIIIStrings, Lists (NotionalHours:6)	Thelearnerwillbeableto- 1. Recognisehowtodeclarestringinpython.[1]* 2. Computesliceoperatorinstring.[3]* 3. JustifyStringsAreImmutable.[5]*
			4. IllustratebuiltinStringMethods.[3]* 5. RecognisehowtodeclareListinpython.[1]* 6. IllustratebuiltinListMethods&Functions.[3]* 7. JustifyListsaremutable.[5]*
		UnitIV Tuples,TextFiles,Built-inExceptions (NotionalHours12)	Thelearnerwillbeableto- 1. RecognisehowtodeclareTuple,Dictionaryinpython.[1]* 2. DifferentiatebetweenTuple&Dictionary.[4]* 3. IllustratebuiltinTupleMethods&Functions.[3]* 4. IllustratebuiltinDictionaryMethods&Functions.[3]* 5. Composedifferentbuiltinfileobjectattributetohandletextfile.[6]* 6. Computedifferentmethodstomanagedirectoriesinpython.[3]*

		UnitV Classes and Objects,MultithreadedProgramming,Modules(NotionalHours12)	Thelearnerwillbeableto- 1. RecogniseconceptofObjectOrientedProgramming.[1]* 2. Illustrateclassdefinition.[3]* 3. Computeinheritance,Methodoverriding,DataEncapsulation,DataHiding.[3]* 4. JustifyInstancesasArguments&returnvalues.[5]* 5. Composethreadmodule.[6]* 6. IllustrateMathmodule&Timemodule.[3]*
		UnitVI CreatingtheGUIFormandAddingWidgets,Widgets&LayoutManagement,LookandFeelCustomization,StoringDatainOurMySQLDatabaseviaOurGUI(NotionalHours12)	Thelearnerwillbeableto- 1. ComposedifferentwidgetsonGUIForm.[6]* 2. Illustratestandardattributes&propertiesofwidgets.[3]* 3. ApplyproperLayoutManagementfeatures.[3]* 4. ComputeconnectiontoMySQLdatabasefromPython.[3]* 5. ComposethePythonGUIdatabaseusingdifferent commands.[6]*
UGIT4P5	PRACTICAL SESSIONS	-	Thelearnerwillbeableto-
			1. ComposefunctioninPython.[3]* 2. Applyconditionalstatement.[3]* 3. Performdifferentfunctiontoworkwithstringsin Python.[3]* 4. PerformdifferentmethodstoworkwithListinPython.[3]* 5. PerformdifferentmethodstoworkwithDictionaryinPython.[3]* 6. Performdifferentoperationwithtextfilelikeread,write &append.[3]* 7. Applyconceptofinheritance.[3]* 8. Composeclass&objectsinPython.[6]* 9. PerformuserdefinedmoduleimportinginPython.[3]*

CourseCode	**CourseTitle**	**Unittitle**	**LearningOutcomes**

UGIT406	DataWareh ouse	UnitI **IntroductiontoData Warehousing** **DataWarehousingDesignC onsiderationandDimension alModeling** (NotionalHours:15)	Thelearnerwillbeableto- 1. ExplainthecharacteristicsofDataWarehouse[2*] 2. Differentiatebetweenoperationalsystemandinformationalsystem[4*] 3. Explainadditive,semi-additiveandnon-additivemeasureswithexamples[2*] 4. Describevariouslevelsofdataredundancyindatawarehouse[2*] 5. DistinguishbetweenOLTPandOLAP[4*] 6. Describefactsinthefacttable[2*] 7. Differentiatebetweenstarandsnowflakeschema[4*] 8. DifferentiatebetweenOLTPdatabaseanddatawarehousedatabase[4*] 9. ExplainDimensionalmodel[2*] 10. Describedevelopingstrategiesusedindevelopmentofdatawarehouse[2*]
		UnitII **AnIntroductiontoOracleWare houseBuilder** **DefiningandImportingS ourceDataStructures** (NotionalHours:15)	Thelearnerwillbeableto- 1. ExplainDesigncentreanditswindows[2*] 2. ExplaincomponentsandarchitectureofOWB[2*] 3. ListandexplainstepstoconfigureRepositoryandWorkSpace.[2*] 4. ExplainModuleandstepsofcreatingOracleDatabaseModule[2*] 5. Giveinferencewhyitisnecessarytoconfigurelistenerbeforecreatingthedatab ase[5*] 6. Explainthestepstoconfigurealistener[2*] 7. ListtheroleofDSN[1*]
			8. ExplainthestepstoconfigureDSN[2*] 9. Explainprocedureofdefiningsourcemetadatamanuallywith DataEditor Object[2*] 10. Differentiatebetweenprojectandmodule[4*]

		UnitIII **DesigningtheTargetStructure** **CreatingtheTargetStructureinOWB** (NotionalHours:15)	Thelearnerwillbeableto- 1. Explaincubeanddimensions[2*] 2. Explainthestepsofimportingmetadataforaflatfile[2*] 3. Describemodule[2*] 4. Explainfunctionalitiesthatcanbeperformedby OWBtocreatenewdatawarehouse[2*] 5. ExplainvarioustabsofCubeEditorinDataObjectEditor[2*] 6. ExplainOWBDesignObjects[2*] 7. Explaincharacteristicsnecessaryfordefiningeverydimension[2*] 8. ExplainthestepstocreateTimeDimensionusingtheTimeDimensionWizard[2*] 9. Deducetheimportanceofcreatingtargetuserandatargetmodulewhile designingDataWarehouseinOWB.[5*] 10. Differentiatebetweenrelationalandmultidimensionalimplementationofdimensionalmodelinadatabase[4*] 11. Giveinferenceabouttimedimensionbeingkeypartofmostdatawarehouse[5*] 12. DescribecubedetailsforacubeintheDataObjectEditor[2*]
		UnitIV **Extract,Transform,andLoadBasics** **DesigningandbuildinganETLmapping** (NotionalHours15)	Thelearnerwillbeableto- 1. ExplainStagingareaanditsadvantagesanddisadvantages[2*] 2. Explainuseofvariouswindoweditorsavailableinmappingeditor[2*] 3. ExplainvariousOWBoperators[2*] 4. Describethestepsforbuildingstagingareatableusing DataObjectEditor[2*] 5. Explainfactorsonwhichstagingdepends[2*] 6. DescribeConstraintstabinDataObjectEditorinOWB[2*] 7. ExplainETLandmanualETLProcess[2*]
			8. DiscussthesignificanceofETLwhilecreatingaDataWarehouse[4*] 9. ExplainuseofAggregatordataflowoperatorusedinmappingbetweensourcesandtargetsinOWB[2*] 10. ExplaintheroleofJoinerdataflowoperatorinmappingsourcesandtargetsinOWB[2*]
		UnitV **ETL:TransformationsandOtherOperators** **Validating,Generating,Deploying,andExecutingObjects** (NotionalHours15)	Thelearnerwillbeableto- 1. Explainstepstoaddprimarykeyforcolumnsofatable inDataObjectEditorwithexamples[2*] 2. Explaincontrolcentremanager[2*] 3. ExplainstepsforvalidatingandgeneratinginDataObjectEditor[2*] 4. DescribeETLTransformation[2*] 5. ExplaintransformationoperatorsinOWB[2*] 6. Explaindefaultoperatingmodesofamapping[2*] 7. DescribethefeaturesofOracleWarehouseBuilder[2*] 8. ExplainKeyLookupoperatoranditsimportanceinmappingOWB[2*] 9. Determinethepossibleresultsafterthevalidationprocess[5*]

		UnitVI **ExtraFeatures** **DatawarehousingandOLAP** (NotionalHours15)	Thelearnerwillbeableto- 1. ExplainMOLAP,metadatasnapshots,ImportMetadataWizard[2*] 2. ExplainMultidimensionalArchitecture[2*] 3. ExplainOLAPTerminologies[2*] 4. ExplainDataSparsity,Data ExplosionwithrespecttoDataWarehouse[2*] 5. ExplainSnapshotanditstypesandsignificance[2*] 6. ExplainfeaturesofIntegratedROLAP[2*] 7. ExplainRoleofRecycleBininOWB[2*] 8. Explaintheimportanceofsynchronizingobjectsin OWB[2*] 9. ExplainOLAPsystemArchitecture[2*]
UGIT4P6	DataWarehousePRACTICALS	-	Thelearnerwillbeableto: 1. ImportthesourcedatastructuresinOracle.[3*] 2. Designthetargetdatastructureusing Oracle [6*] 3. CreatethetargetstructureinOWB(OracleWebBuilder)[6*] 4. DesignandbuildtheETLmapping[6*]
			5. PerformtheETLprocessandtransformittodatamarts.[3*] 6. CreatethecubeandprocessitinOWB.[6*] 7. Generatethedifferenttypesofreportsinusing Oracle.[6*] 8. Performthedeployment of Warehouse[3*] 9. CreatethePivottableandPivotchartusingsomeexistingdataorcreatethenewdata.[6*] 10. Importthecubeinaccessandcreate Pivottableandchart.[3*]

Course Code	**CourseTitle**	**Unittitle**	**LearningOutcomes**

UGIT501	**SoftwareQuality Assurance**	UnitI **Introduction:**HistoricalPerspectiveof Quality,WhatisQuality?(Isitafactorperception?),DefinitionsofQuality,CoreComponentsofQuality,QualityView, FinancialAspectofQuality,Customers,SuppliersandProcesses,TotalQualityManagement(TQM),QualityPrinciplesofTotalQualityManagement,QualityManagementThroughStatisticalProcessControl,QualityManagementThroughCulturalChanges,Continual(Continuous)Improvement Cycle,QualityinDifferentAreas,Benchmarking andMetrics, ProblemSolvingTechniques,ProblemSolvingSoftwareTools. **SoftwareQuality::**Introduction,ConstraintsofSoftware ProductQualityAssessment,CustomerisaKing,QualityandProductivityRelationship,RequirementsofaProduct, OrganizationCulture,CharacteristicsofSoftware,SoftwareDevelopmentProcess,TypesofProducts,Schemesof CriticalityDefinitions,ProblematicAreasofSoftware	Thelearnerwillbeableto- 1. Understandsoftwaretestingandqualityassuranceasafundamentalcomponentofsoftwarelifecycle[2*] 2. Understandtheroleofmetricsinsoftware qualityassuranceandbeabletoapplythesemetricstodocumentandmeasurequalityofvariousphasesofsoftwaredevelopment.[2*] 3. Describe theideaofdecomposingthegiven problemintoAnalysis,Desing,Implementation,TestingandMaintenancephases.[1*] 4. Explainingproblemsolvingtechniqueandsoftwaretools [2*] 5. Explain theTotalQualityManagementwithsketches [2*] 6. StudydifferentaspectsofQuality Management[3*]
		DevelopmentLifeCycle,SoftwareQualityManagement, WhySoftwareHasDefects?ProcessesRelatedtoSoftware Quality,QualityManagementSystemStructure,PillarsofQualityManagementSystem,ImportantAspectsofQualityManagement.(NotionalHours:15)	

UGIT501	**Fundamentalsoftesting**	UnitII **Fundamentalsoftesting:**Introduction,Necessityoftesting,Whatistesting?Fundamental test process,Thepsychologyoftesting, HistoricalPerspectiveofTesting,Definitions of Testing, Approaches toTesting,TestingDuringDevelopmentLifeCycle,RequirementTraceabilityMatrix,EssentialsofSoftwareTesting,Workbench,ImportantFeaturesofTestingProcess, MisconceptionsAboutTesting,PrinciplesofSoftwareTesting,SalientFeaturesofGoodTesting,TestPolicy,TestStrategyorTestApproach,Test Planning, Testing Process andNumberofDefectsFoundinTesting,TestTeamEfficiency, MutationTesting,ChallengesinTesting,TestTeamApproach,ProcessProblemsFacedbyTesting,CostAspectofTesting,EstablishingTestingPolicy,Methods,StructuredApproachtoTesting,	Thelearnerwillbeableto- 1. Explaintheconceptsofvarioussoftwaretestingmethods&beabletoapplyappropriatetestingapproachesfordevelopmentofsoftware.[2*] 2. Applyandevaluateappropriateprocessesandtoolstoasoftwaredevelopmentprojectforquality assurance.[3*,5*] 3. StudyImportantFeaturesofTesting Process.[3*] 4. Evaluatingthecostaspectsoftesting[5*] 5. Designingpolicyandmethodsoftesting[6*]
UGIT501	**Introductiontothe DefectManagement**	UnitIII **DefectManagement:**CategoriesofDefect,Defect,Error,orMistakeinSoftware,DevelopingTestStrategy,DevelopingTestingMethodologies(TestPlan),TestingProcess,AttitudeTowardsTesting(Common People Issues), Test	Thelearnerwillbeableto- 1. Describingthecategoriesofdefectmanagement[1*] 2. Understatingthedifferencein defect,error andmistake[2*] 3. StudyofdifferentTestMethodologies[3*]
		Methodologies/Approaches,PeopleChallengesinSoftwareTesting,RaisingManagement AwarenessforTesting,SkillsRequiredbyTester, Testing throughout thesoftwarelifecycle, Softwaredevelopmentmodels,Test levels, Testtypes,thetargetsoftesting,Maintenancetesting **UnitTesting:**NormalBoundaryValueTesting,RobustBoundaryValueTesting,Worst-CaseBoundaryValueTesting,SpecialValueTesting,Examples,RandomTesting,GuidelinesforBoundaryValueTesting,EquivalenceClassTesting:EquivalenceClasses,TraditionalEquivalenceClassTesting,ImprovedEquivalenceClassTesting,EdgeTesting,GuidelinesandObservations.Decision(NotionalHours:15)	4. Describethechallengesandawarenessofsoftwaretestingprocess[1*] 5. Explainstagesofsoftwaredevelopmentmodelwithsketch[2*] 6. Compareand studyof differentboundary value testing inunittesting[4*,3*] 7. Compareand studyof differentEquivalenceClassTestinginunittesting[4*,3*]

UGIT501	**Table–BasedTesting**	**UnitIV** **Table–BasedTesting:** Table–Based Testing:DecisionTables,DecisionTableTechniques,Cause-and-EffectGraphing,GuidelinesandObservations,PathTesting:ProgramGraphs,DD-Paths,TestCoverageMetrics,BasisPathTesting,GuidelinesandObservations,DataFlowTesting:Define/UseTesting,Slice-BasedTesting,ProgramSlicingTools. **SoftwareVerificationandValidation:**Introduction,Verification,VerificationWorkbench,MethodsofVerification,TypesofreviewsonthebasisodStagePhase,Entitiesinvolvedinverification,Reviewsintestinglifecycle,CoverageinVerification,ConcernsofVerification,Validation,Validat	Thelearnerwillbeableto- 1. Studyof differentaspectsofTable–BasedTesting[3*] 2. Studyofdifferentaspect pathtesting[3*] 3. Explainandcomparedifferentdataflowtesting[2*,4*] 4. Analysinganeffectiveinspectionthrough SoftwareVerificationandValidation toevaluatetheresultstomakeprocessimprovements.[4*] 5. Evaluate theprocessandlevelofsoftwareverificationandvalidationbyusingdifferenttechnique .[5*]
		LevelsofValidation,CoverageinValidation,Acceptance Testing,ManagementofVerificationandValidation,Softwaredevelopmentverificationandvalidationactivities. (NotionalHours15)	
V	**V-TestModeland LevelsofTesting**	UnitV **V-TestModel**Introduction,V-modelforsoftware,TestingduringProposalstage,Testingduringrequirementstage,Testingduringtestplanningphase, Testing during designphase,Testing during coding,VVModel,CriticalRolesandResponsibilities **LevelsofTesting:**Introduction,ProposalTesting,RequirementTesting,DesignTesting,CodeReview,UnitTesting, ModuleTesting,IntegrationTesting,Big-BangTesting,SandwichTesting,CriticalPathFirst,SubSystemTesting,SystemTesting,TestingStages.	Thelearnerwillbeableto- 1. DescribeandcomparedifferentstagesofV& Vmodel[1*4*] 2. Studyof differentRolesand Responsibilities whileexecutingV–model[3*] 3. Classifying differentleveloftesting[2*] 4. Comparingof differentleveloftesting[4*]

UGIT501	**Introductionto SpecialTests**	**UNITVI** **SpecialTests:**Introduction,GUItesting,CompatibilityTesting,SecurityTesting,PerformanceTesting,VolumeTesting,StressTesting,RecoveryTesting,InstallationTesting,RequirementTesting,Regression Testing,ErrorHandlingTesting, ManualSupportTesting,IntersystemTesting,ControlTesting,SmokeTesting,AdhocTesting,ParallelTesting,ExecutionTesting,OperationsTesting,ComplianceTesting, Usability Testing, Decision Table Testing,	Thelearnerwillbeableto- 1. Listingandstudyofdifferenttypesof Specialtesting [1*] 2. Compareofseveraltypesofspecialtesting[4*] 3. Designingofdocumentationtesting [6*] 4. StudyofAgileDevelopmentTestingwithusingsketches[3*]
		DocumentationTesting,Trainingtesting, RapidTesting,Controlflowgraph,GeneratingtestsonthebasisofCombinatorialDesigns,StateGraph,RiskAssociated withNewTechnologies,ProcessmaturitylevelofTechnology,TestingAdequacyofControlinNewtechnologyusage,ObjectOrientedApplicationTesting,TestingofInternalControls,COTSTesting,ClientServerTesting,WebApplication Testing,MobileApplicationTesting,eBusinesseCommerceTesting,AgileDevelopmentTesting,DataWarehousingTesting	
Course Code	**CourseTitle**	**Unittitle**	**LearningOutcomes**

UGIT501	**IntroductiontoRedHatEnterpriseLinux**	UnitI **IntroductiontoRedHatEnterpriseLinux:**Linux,OpenSourceandRedHat,OriginsofLinux,Distributions,DutiesofLinuxSystemAdministrator.**CommandLine:**WorkingwiththeBashShell,GettingtheBestofBash,UsefulBashKeySequences,WorkingwithBashHistory,PerformingBasicFileSystemManagementTasks,Workingwith Directories,PipingandRedirection,FindingFiles **SystemAdministrationTasks:**PerformingJobManagementTasks,SystemandProcessMonitoringandManagement,ManagingProcesseswithps,SendingSignalstoProcesseswiththekillCommand,usingtoptoShowCurrentSystemActivity,ManagingProcessNiceness,SchedulingJobs,MountingDevices,WorkingwithLinks,CreatingBackups,ManagingPrinters,SettingUpSystemLogging,SettingUpRsyslog,CommonLogFiles,SettingUpLogrotate	Thelearnerwillbeableto- 1. Demonstrateof InstallandconfiguretheLinuxoperatingsystem[2*] 2. Describethefundamentalsofsystem administration[1*] 3. Outlinethetasksofasystemadministrator. 4. understandthebasiccommandsoflinuxoperatingsystemandcanwriteshellscripts[2*] 5. SummarisingthehistoryofBashShell.[2*] 6. Recognisingofdifferent systemadministrationtask[1*] 7. StudyofseveralcommandformanagingprocessesandsystemdevicesS.[3*] 8. Analysingdifferentlogsettings[3*] 9. UnderstandingdifferentaspectsofManagingsoftwareoflinux[2*]
		ManagingSoftware:UnderstandingRPM,UnderstandingMetaPackageHandlers,CreatingYourOwnRepositories,ManagingRepositories,InstallingSoftwarewithYum,QueryingSoftware,ExtractingFilesfromRPMPackages (NotionalHours:15)	

UGIT501	**ConfiguringandManagingStorage**	UnitII **ConfiguringandManagingStorage:**UnderstandingPartitionsandLogicalVolumes,CreatingPartitions,CreatingFileSystems,FileSystemsOverview,CreatingFileSystems,ChangingFileSystemProperties,CheckingtheFileSystemIntegrity,MountingFileSystemsAutomaticallyThroughfstab,WorkingwithLogicalVolumes,CreatingLogicalVolumes,ResizingLogicalVolumes,WorkingwithSnapshots,ReplacingFailingStorageDevices,CreatingSwapSpace,WorkingwithEncryptedVolumes **ConnectingtotheNetwork:**UnderstandingNetworkManager,WorkingwithServicesandRunlevels,ConfiguringtheNetworkwithNetworkManager,Workingwithsystem-config-network,NetworkManagerConfigurationFiles,NetworkServiceScripts,NetworkingfromtheCommandLine,TroubleshootingNetworking,SettingUpIPv6,ConfiguringSSH,EnablingtheSSHServer,UsingtheSSHClient,UsingPuTTYonWindowsMachines,ConfiguringKeyBasedSSHAuthentication,Using	Thelearnerwillbeableto- 1. Constructingthestorage forfilesystem[6*] 2. Understandingtheconceptofmemorypartition.[2*] 3. Studyandconstructing differentpartitionforlinuxfilesystem[3*,6*] 4. Understandingtheservicesandrunlevelofnetworkmanager[2*] 5. Executingtheconfigurationfileandservicescriptoncommandline [3*] 6. Understanding,configuringandexecutingof SSHclient/Server [2*.3*] 7. StudyofUser,Groupanditspermission[3*]. 8. Classifyingand creatinguser,andgroupsinLinuxsystem.[2*,6*]
		GraphicalApplicationswithSSH,UsingSSHPortForwarding,ConfiguringVNCServerAccess . **WorkingwithUsers,Groups,andPermissions**:ManagingUsersandGroups,CommandsforUserManagement,ManagingPasswords,ModifyingandDeletingUserAccounts,ConfigurationFiles,CreatingGroups,UsingGraphicalToolsforUser,andGroupManagement,UsingExternalAuthenticationSources,theAuthenticationProcess,sssd,nsswitch,PluggableAuthenticationModules,ManagingPermissions,theRoleofOwnership,BasicPermissions:Read,Write,andExecute,AdvancedPermissions,WorkingwithAccessControlLists,SettingDefaultPermissionswithumask,WorkingwithAttributes (NotionalHours:15)	

UGIT501	**SecuringServer withiptables**	UnitIII **SecuringServerwithiptables:**UnderstandingFirewalls,SettingUpaFirewallwithsystem-config-firewall,AllowingServices,TrustedInterfaces,Masquerading,ConfigurationFiles,SettingUpaFirewallwithiptables,Tables,Chains,andRules,CompositionofRule,ConfigurationExample,AdvancediptablesConfiguration,ConfiguringLogging,TheLimitModule,ConfiguringNAT **SettingUpCryptographicServices:**IntroducingSSL,ProofofAuthenticity:TheCertificateAuthority,ManagingCertificateswithopenssl,CreatingaSigningRequest,WorkingwithGNUPrivacyGuard,	Thelearnerwillbeableto- 1. Understandingfirewallsforsecuringserverwithiptable[2*] 2. Constructing iptableusingfirewall[6*] 3. Analyzetheneedforsecuritymeasuresforalinuxenvironment.[3*] 4. Studyandconstruct**CryptographicServicesusingSSL[3*6*]** 5. Studyandconstructionofnetworkfile server(NFS)[3*6*]
		CreatingGPGKeys,KeyTransfer,ManagingGPGKeys,EncryptingFileswithGPG,GPGSigning,SigningRPMFilesConfiguring **ServerforFileSharing**:WhatisNFS?AdvantagesandDisadvantagesofNFS,ConfiguringNFS4,SettingUpNFSv4,MountinganNFSShare,MakingNFSMountsPersistent,ConfiguringAutomount,ConfiguringSamba,SettingUpaSambaFileServer,SambaAdvancedAuthenticationOptions,AccessingSambaShares,OfferingFTPServices (NotionalHours:15)	

UGIT501	**ConfiguringDNS andDHCP**	**UnitIV** **ConfiguringDNSandDHCP**:IntroductiontoDNS,TheDNSHierarchy,DNSServerTypes,TheDNSLookupProcess,DNSZoneTypes,SettingUpaDNSServer,SettingUpaCache-OnlyNameServer,SettingUpaPrimaryNameServer,SettingUpaSecondaryNameServer,UnderstandingDHCP,SettingUpaDHCPServer **SettingUpaMailServer**:UsingtheMessageTransferAgent,theMailDeliveryAgent,theMailUserAgent,SettingUpPostfixasanSMTPServer,WorkingwithMutt,BasicConfiguration,InternetConfiguration,ConfiguringDovecotforPOPandIMAP (NotionalHours15)	Thelearnerwillbeableto- 1. SummarisingHierarchyandseveraltypesofDNSServer.[2*] 2. DesigningCache-Only,primaryandsecondaryNameServer[6*] 3. UnderstandinganddesigningDHCPServer[2*6*] 4. StudyofDifferentMailAgentforMailserver[3*] 5. Constructing MailserverusingHTTP,SMTP,POPandIMAP [6*]
UGIT501	**Configuring**	UnitV	Thelearnerwillbeableto-
	ApacheonRed HatEnterprise Linux	**ConfiguringApacheonRedHatEnterpriseLinux :**ConfiguringtheApacheWebServer,creatingaBasicWebsite,UnderstandingtheApacheConfigurationFiles,ApacheLogFiles,WorkingwithVirtualHosts,SecuringtheWebServerwithTLSCertificates,ConfiguringAuthentication,SettingUpAuthenticationwith.htpasswd,ConfiguringLDAPAuthentication,SettingUpMySQL **IntroducingBashShellScripting**:Introduction,ElementsofaGoodShellScript,ExecutingtheScript,WorkingwithVariablesandInput,UnderstandingVariables,Variables,Subshells,andSourcing,WorkingwithScriptArguments,AskingforInput,UsingCommandSubstitution,SubstitutionOperators,ChangingVariableContentwithPatternMatching,PerformingCalculations,UsingControlStructures,Usingif...then...else,Usingcase,Usingwhile,Usinguntil,Usingfor,ConfiguringbootingwithGRUB. (NotionalHours15)	1. Understanding andconstructing ApacheonRedHatEnterpriseLinux[2*6*] 2. CreatingAuthenticationwith.httppasword[6*] 3. Understanding ofdifferentaspect**BashShellScripting[2*]** 4. Explainingtheelement ofgoodshell script[2*] 5. Analysetheworkingof Argument,Input,Operatorsinshellscripting[4*] 6. Studyand designing scriptsusingcontrolstructure[3*6*] 7. Understandingandconstructbootingwith GRUB[2*6*] 8.

UGIT501	**High-AvailabilityClustering**	**UNITVI** **High-AvailabilityClustering:**High-AvailabilityClustering,TheWorkingsofHighAvailability,High-AvailabilityRequirements,RedHatHigh-AvailabilityAdd-onSoftware,Components,ConfiguringCluster-BasedServices,SettingUpBonding,SettingUpSharedStorage,InstallingtheRedHatHighAvailabilityAdd-	Thelearnerwillbeableto- 1. Understanding workingand RequirementsofRed–HatHigh-AvailabilityClustering[2*] 2. StudyofAdd-onsoftware and clusterbased servicesinRedHatHigh-Availabilityclustering[3*]
		Cluster,ConfiguringAdditionalClusterProperties,ConfiguringaQuorumDisk,SettingUpFencing,CreatingResourcesandServices,TroubleshootingaNonoperationalCluster,ConfiguringGFS2File **SystemsSettingUpanInstallationServer**:ConfiguringaNetworkServerasanInstallationServer,SettingUpaTFTPandDHCPServerforPXEBoot,InstallingtheTFTPServer,ConfiguringDHCPforPXEBoot,CreatingtheTFTPPXEServerContent,creatingaKickstartFile,UsingaKickstartFiletoPerformanAutomated,Installation,ModifyingtheKickstartFilewith,system-config-kickstart,MakingManualModificationstotheKickstartFile(NotionalHours15)	3. UnderstandingTroubleshootingaNonoperationalClusterand creatingResourcesandServices,[2*6*] 4. AnalysingandConstructingNetworkServerasanInstallationServer[4*6*]

Course Code	**Course Title**	**Unit title**	**Learning Outcomes**
UGIT502	**Computer networking**	Unit I **Introduction:** Data communications, networks, network types, Internethistory,standards and administration. **Network Models:**Protocol layering, TCP/IP protocol suite, The OSI model. **Introduction to Physicallayer:**Data and signals, periodic analog signals, digital signals, transmission impairment, data rate limits, performance	The learnerwill be ableto- 1. Describe role of the data communication in computer networks [1*] 2. Study the different aspects of networks. [1]* 3. Distinguish the protocol layers in TCP/IP and ISO model [4*] 4. Explaining the analog and digital signal in physical layer. [2*]

		Media **Switching:**Introduction, circuit switched networks, packet switching, structure ofa switch. (Notional Hours: 15)	4. Study of different transmission media .[3*] 5. Explain with sketches the contraction of given type of cable[2*] 6. Explain with sketches the characteristics of unguided transmistion media [2*] 7. Describe with sketches the working principle of the given switching technique .[1*] 8. Compare different switching techniques on the given parameter [4*]
UGIT502	**Introduction to the Data Link Layer**	Unit III **Introduction to the Data Link Layer:**Link layer addressing, Data Link Layer Design Issues, Error detection and correction, block coding, cyclic codes, checksum, forward error correction, error correcting codes, error detecting codes. **Data LinkControl:** DLC services, data link layer protocols, HDLC, Point-to-point protocol. **Media Access Control**:Randomaccess, controlled access,channelization,Wired LANs – Ethernet Protocol, standardethernet, fast ethernet, gigabit ethernet, 10 gigabitethernet, (Notional Hours: 15)	The learnerwill be ableto- 1. Enables thestudentsto examine various Data Link layer design issues and Data Link protocols.[1*] 2. Study data link layer concepts, services , and protocols.[3*] 3. Describe different techniques of data link control i.eHDLC and ,point to point protocol [1*]. 4. Classify various wired transmission media for data communication networks [2*] 5. Compare the standard ethernet, fast ethernet, gigabit ethernet, 10 gigabit ethernet, in wired LANs [4*] 6.
UGIT502	**Wireless LANs& Introduction to the**	Unit IV **Wireless LANs:**Introduction, IEEE 802.11 project, Bluetooth, WiMAX, Cellular telephony, Satellite networks.	The learnerwill be ableto- 1. Explain characteristics ofthe IEEE 802.11 in wireless LANs [2*]

	Network Layer	**Connecting devices and Virtual LANs.** **Introduction to the Network Layer**: Network layer services, packet switching, network layer performance, IPv4 addressing, forwarding of IP packets, Internet Protocol, ICMPv4, Mobile IP (Notional Hours 15)	2. Compare and study of Connecting devices and Virtual LANs.[4*,3*] 3. Study of network layer services and performance [3*]
UGIT502	**Routing**	UnitV **Unicast Routing:**Introduction, routing algorithms, unicast routing protocols. **Next generation IP:**IPv6 addressing, IPv6 protocol, ICMPv6 protocol, transition fromIPv4 to IPv6.	The learnerwill be ableto- 1. Enables thestudents to compare and select appropriate routing algorithms for a network [4*,5*] 2. DescribeAddressing ofIP V4.[1*] 3. Understanding the transition fromIPv4 to IPv6 [2*]Study of various transport layer protocol .[3*]
UGIT502	**Introduction to the Transport Layer**	**UNIT VI** **Introduction to the Transport Layer**: Introduction, Transport layer protocols (Simple protocol, Stop-and-wait protocol, Go-Back-n protocol, Selective repeat protocol, Bidirectional protocols), Transport layer services, User datagramprotocol, Transmission control protocol, **Standard Client/Server Protocols:**World wide-web and HTTP, FTP, Electronic mail, Telnet, Secured Shell, Domain name system.	1. Classify diffident transport layer services [2*] 2. Study of different client /server protocol [3*] 3. Compare Standard Client/Server Protocol [4*] 4. Understandthe internal functionalities of main protocols such as HTTP, FTP, EMAIL, Telnet,SSH,DNS [2*]

Course Code	**CourseTitle**	**Unittitle**	**LearningOutcomes**

UGIT503	AdvancedWebProgramming	UnitI Introducing.NET,TheC#Language(NotionalHours:10)	Thelearnerwillbeableto- 1. Understand.NetFramework.[2]* 2. Imaginethebackgroundworkingof.NetFramework.[6]* 3. KnowthebasicsofC#.[1]* 4. SolvetheproblemonC#.[3]*
		UnitII Types,Objects,andNamespaces,ErrorHandling,Logging,andTracing,WebFormFundamentals(NotionalHours:10)	Thelearnerwillbeableto- 1. SolvetheproblemonC#.[3]* 2. TellwhytheExceptionhandlingisnecessary.[5]* 3. Listthedifferentfilesandfoldersinvolvedintheworkingof ASP.Netwebsite.[1]* 4. Describethedifferentphasesandworkingof ASP.Netpagelifecycle.[2]* 5. Understandtheimportanceofweb.configfile.[2]*
		UnitIII FormControls, WebsiteNavigation,XML	Thelearnerwillbeableto-
		(NotionalHours:10)	1. ListthedifferentWebFormControl.[1]* 2. Understandtheimportanceofrichandusercontrols.[2]* 3. PerformreadingwritingofXMLfile.[3]* 4. EvaluatetheneedofXMLfileintheprocessing.[5]*
		UnitIV StateManagement,Styles,Themes,andMasterPages (NotionalHours10)	Thelearnerwillbeableto- 1. DescribetheneedofStateManagement.[2]* 2. Applydifferentstatemanagementtechniquesintheir Website.[3]* 3. PredictadvantagesanddisadvantagesofCSS.[5]* 4. UnderstandimportanceofTheme.[2]* 5. ImaginetheworkingofMasterpages.[6]*

		UnitV ADO.NETFundamentals,DataBinding,TheDataControls (NotionalHours10)	Thelearnerwillbeableto- 1. Studythetypesofdatabaseconnectivity.[3]* 2. Describetheclassesinvolvedindatabaseconnectivity.[2]* 3. GeneratetheWebformtoDatabase connectivity.[6]* 4. ExaminetheworkingofdifferentDatacontrols.[4]*
		UnitVI Caching,SecurityFundamentals,ASP.NETAJAX(NotionalHours10)	Thelearnerwillbeableto- 1. UnderstandtheroleofCachinginpagewebprocessing.[2]* 2. DiscusstheimportanceofSecurity.[2]*
			3. ImaginetheprocessofAuthenticationandAuthorization.[6]* 4. DevelopattractivewebsiteusingAJAX.[6]* 5. PredictadvantagesanddisadvantagesofAJAX.[5]*
UGIT5P3	PRACTICAL SESSIONS	-	Thelearnerwillbeableto- 1. PerformC#programs.[3]* 2. Writecodetoworkwithanywebformcontrols.[1]* 3. ApplySessionandCookiesintheirWebsite.[3]* 4. GeneratetheWebformtoDatabaseconnectivity.[6]* 5. DevelopattractivewebsiteusingAJAX.[6]* 6. ApplysecuritytotheirWebsite.[3]*

Course Code	**CourseTitle**	**Unittitle**	**LearningOutcomes**

UGIT504	InternetofThings	UnitI TheInternetofThings:AnOverview DesignPrinciplesforConnectedDevices(NotionalHours:15)	Thelearnerwillbeableto- 1. ExplaintheflavoursofInternetofThings[2*] 2. DefineInternetofThings[1*] 3. SummarizethetechnologyofInternetofThings[2*] 4. Discusstheenchantedobjects[2*] 5. DescribethemakersofInternetofThings[2*] 6. GivemainideabehindCalmandAmbientTechnology.[2*] 7. JustifyMagicasMetaphor[5*] 8. Justifytheownerofdata.[5*] 9. Analysethe“ParkAssist”application[5*] 10. Explaingracefuldegradation,firstclasscitizensonInternetwithexamples[2*] 11. ExplainAffordanceswithexamples[2*]
		UnitII InternetPrinciplesThinkingaboutPrototyping(NotionalHours:15)	Thelearnerwillbeableto- 1. DescribeIP,TCP[2*] 2. ExplaintheInternetProtocolSuite[2*] 3. CompareStaticIPassignmentandDynamicIPassignment[4*] 4. CompareIPv4andIPv6[4*] 5. ExplainTCPandUDPports[2*] 6. AnalysetheHTTPrequestandresponse[4*] 7. ExplainencryptedHTTP[2*]
			8. Describeotherapplicationprotocols[2*] 9. ExplainSketchingwithexample[2*] 10. Evaluatecostversuseaseofprototyping[5*] 11. Justify“Whyclosedsource”[5*] 12. ListadvantagesanddisadvantagesofOpensource[2*] 13. Assessopensourceasacompetitiveadvantage[5*] 14. Assessopensourceasastrategicweapon[5*] 15. Discussabouttappingintothecommunity[2*]
		UnitIII PrototypingEmbedded Devices (NotionalHours:15)	Thelearnerwillbeableto- 1. Comparesensorsandactuators[4*] 2. DescribethejourneyofPCB[2*] 3. Analysetheparametersforchoosingtheplatform[4*] 4. AnalysethedevelopmentonArduino[4*] 5. CompareArduinoDueandRaspberryPi[5*] 6. AnalysethedevelopmentonRaspberryPi[4*]

		UnitIV PrototypingthePhysical Design PrototypingOnlineComponents(Notional Hours15)	Thelearnerwillbeableto- 1. Describethephasesofpreparation,sketching,iterating,exploring[2*] 2. Explainthenon-digital methods[2*] 3. DescribeLaserCutting[2*] 4. Describethesoftwareusedinlasercutting[2*] 5. Describe3Dprinting[2*] 6. Analysevarious3Dprintingmethods[4*] 7. DescribeCNCmilling[2*] 8. Assessthe“Acker’sBell”[5*] 9. ExplaintheconceptofmashingandscrappingAPI’s[2*] 10. WriteanewAPI[6*] 11. Explainconceptofsecuritywithexampleoftimer[2*] 12. Listandexplainthestandardstoconsiderforimplementing API
			[2*] 13. Explainparameterstobeconsideredwhendecidingonaplatformforweb backendwiththehelpofexample(PERL).[2*] 14. DeducethefactorssuchasAPIratelimiting,InteractionviaHTML, DesigningwebApplicationswithrespecttoAPI[5*] 15. ExplainPollingandComet[2*] 16. ShowtheimplementationofComet[3*] 17. Analyseandrecommendotherprotocolsthatcanreplace HTTP[5*]
		UnitV Techniquesforwritingembeddedcode Business Models(NotionalHours 15)	Thelearnerwillbeableto- 1. Explainmemorymanagement[2*] 2. DeducethemaximumRAMutilization[5*] 3. EvaluateStackandHeap[5*] 4. Explainperformanceandbatterylife[2*] 5. Deducefewhabitstomakecodeefficient[5*] 6. Listlibrariesavailable[2*] 7. Explaindebugginginsoftwareandhardware[2*] 8. Explainissuesinlogging[2*] 9. ExplainhistoryofBusinessmodels[2*] 10. Describeuseofbusinessmodel[2*] 11. Determinewhoisthebusinessmodelusedfor[5*] 12. ExplainmodelsusedbyIoTcompanies[2*] 13. Listandexplainwaysoffundingforastartup[2*] 14. Describeleanstartups[2*]

		UnitVI MovingtoManufacture Ethics (NotionalHours15)	Thelearnerwillbeableto- 1. DiscussdifferentpossibilitiesthatshouldbeconsideredbeforeproducingaProduct[2*] 2. ExplainprocessofdesigningPCBandexplainsoftwarechoices forit[2*] 3. ListandexplainthepossiblewaysofmanufacturingPCB[2*]
			4. Explaintheprocessofmassproductionofcases[2*] 5. Analysemanufacturingprocesswithrespecttothe“BERGPrinter”[5*] 6. DiscusscertificationissueswithIoTproducts[2*] 7. AnalysetheconstraintsthataffectthecostofPCB[4*] 8. Discussaboutscalingupthesoftware[2*] 9. SummarizeaboutInternetofThings[2*] 10. Justifyhowinternetaffectstheprivacy[5*] 11. Explaindisruptingandcrowdsourcing[2*] 12. Listandexplainfivecriticalrequirementsobservedin Fisher’soriginaldefinitionforasensorcommonsproject.[2*] 13. Determinehowtomeasuretheenvironmentalcost[5*] 14. JustifyuseofIoTasapartofsolution[5*] 15. Describecautiousoptimism[2*] 16. DefineopenInternetofThings[1*]
UGIT5P4	INTERNETOFTHINGSPRACTICALS	-	Thelearnerwillbeableto: 1. InstallandstartRaspbianOperatingSystem[3*] 2. DisplaydifferentLEDpatternswithRaspberryPi[3*] 3. Displaytimeover4-Digit7-SegmentDisplayusingRaspberryPi[3*] 4. BuildaRaspberryPibasedOscilloscope[6*] 5. ControllingRaspberryPiusingWhatsApp[6*] 6. SettingwirelessaccesspointusingRaspberryPi[3*] 7. InterfacingFingerPrintsensorusingRaspberryPi[6*] 8. InterfacingGPSmoduleusingRaspberryPi[3*] 9. DevelopanIoTbasedHomeAutomationusingRaspberryPi[6*] 10. DevelopvisitormonitoringsystemusingRaspberryPi[6*] 11. InterfacingRFIDusingRaspberryPi[3*] 12. BuildGoogleAssistantusingRaspberryPi[6*] 13. InstallingWindows10IoTcoreonRaspberryPi[3*]

Course Code	**CourseTitle**	**Unittitle**	**LearningOutcomes**

UGIT505	ArtificialIntelligence	UnitI Introduction,IntelligentAgents(NotionalHours:12)	Thelearnerwillbeableto- 1. DefineArtificialIntelligence.[2]* 2. DiscussfoundationofAI.[2]* 3. EvaluatethestateofartAItoday.[5]* 4. DiscusshistoryofAI.[2]*6
		UnitII SolvingProblemsbySearching,BeyondClassicalSearch (NotionalHours:12)	Thelearnerwillbeableto- 1. Discussproblemsolvingagents.[2]* 2. Illustrateproblemsolvingexamples&theirsolutions.[3]* 3. Differentiatebetweeninformedsearch&uninformed search.[4]* 4. DefineheuristicfunctionsinAI.[2]* 5. Discusslocalsearchalgorithm.[2]* 6. Differentiatebetweensearchingwithnondeterministicaction&searchingwithpartialobservations.[4]* 7. Discussonlinesearchagents&unknownenvironment.[2]*
		UnitIIIAdversarialSearch,LogicalAgents (NotionalHours:12)	Thelearnerwillbeableto- 1. Definegames.[2]* 2. Discussoptimaldecisioningames.[2]* 3. Discussdifferenttypesofgames.[2]* 4. Definestochasticgames,partiallyobservablegames.[2]* 5. Illustratestate-of-the-aregameprograms.[3]*
			6. DefineKnowledgebaseagents.[2]* 7. DifferentiatebetweentheWumpusworldlogic&propositionallogic.[4]* 8. Discusspropositionaltheoremproving&effectivepropositionalmodelchecking.[2]* 9. Illustrateagentsbasedonpropositionallogic.[3]*
		UnitIV FirstOrderLogic,InferenceinFirstOrderLogic (NotionalHours12)	Thelearnerwillbeableto- 1. DiscussSyntaxandsemantic.[2]* 2. IllustrateFirstOrderLogic.[3]* 3. DefineKnowledgeengineeringinFirstOrderLogic.[2]* 4. Differentiatebetweenpropositional&FirstOrder.[4]* 5. Discussunificationandlifting.[2]* 6. Recogniseforwardandbackwardchaining&itsresolution.

		UnitV Planning(Notional Hours6)	Thelearnerwillbeableto- 1. DefineClassicalPlanning.[2]* 2. DiscussAlgorithmsforplanningasstatespacesearch.[2]* 3. Interpretplanninggraphs&otherclassicalplanningapproaches.[3]* 4. ConstructPlanningandActinginNondeterministicDomains.[3]* 5. Differentiatebetweenmultiagent&hierarchicalplanning.[4]*
		UnitVI KnowledgeRepresentation(Notional Hours6)	Thelearnerwillbeableto- 1. DiscussCategoriesandObjects.[2]* 2. Discussevents,mentaleventsandobjects.[2]* 3. Illustratereasoningsystemsforcategories&reasoningwithdefaultinformation.[3]* 4. DefineInternetshoppingworld.[2]*
UGIT5P	PRACTICAL SESSIONS	-	Thelearnerwillbeableto-
			1. Performdepthfirstsearchalgorithm.[3]* 2. Applybreadthfirstsearchalgorithm.[3]* 3. Performdifferent4-Queen/N-Queenproblem.[3]* 4. Performdifferentalphabetasearch.[3]* 5. PerformA*&AO*algorithm.[3]* 6. Applytic–tac–toegameusingmin-maxalgorithm.[3]* 7. PerformsolveMissionariesandCannibalsproblem..[3]* 8. Composeclass&objectsinPython.[6]* 9. PerformexpressionsbasedonAssociativelaw&Distributivelaw.[3]*

Course Code	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT506	Enterprise Java	UnitI UnderstandingJavaEE, JavaEEArchitecture,ServerandContainers,IntroductiontoJavaServlets, ServletAPIandLifecycle, WorkingwithServlets(NotionalHours:10)	Thelearnerwillbeableto- 1. UnderstandtheconceptofJavaEE.[2]* 2. CompareandcontrastbetweenServerandContainers.[4]* 3. ExplainJavaServlets.[2]* 4. SchematicallyrepresentServletAPIandLifecycle.[4]* 5. DescribetheworkingwithServlets.[2]*

		UnitII WorkingwithDatabases,R equestDispatcher,COOKI ES, SESSION (NotionalHours:10)	Thelearnerwillbeableto- 1. ExplainworkingwithDatabases.[2]* 2. UnderstandMethodsofRequestDispatcherint erface.[2]* 3. UsingRequestDispatcherInterfacecreatea Servlet.[3]* 4. DescribetheCOOKIES.[2]* 5. UnderstandtheSessions,LifecycleOfHttpSess ion.[2]*
		UnitIII WorkingwithFiles, WorkingwithNon-BlockingI/O,	Thelearnerwillbeableto- 1. Illustrateconceptofworkingwithfiles.[3]*
		IntroductiontoJavaServerPages(NotionalH ours:10)	2. DescribetheworkingwithNon-BlockingI/O.[2]* 3. UnderstandconceptoftheJSP.[2]* 4. CompareandcontrastbetweenAdvantagesofusingJSPa ndDisadvantagesofusingJSP.[4]* 5. ExplainhowJSPpagesaremoreadvantageousthan Servlet.[2]*
		UnitIV GettingStartedWithJavaServerPages,ActionElements, ImplicitObjects,ScopeandElExpressions,Jav aServerPagesStandardTagLibraries(Notional Hours10)	Thelearnerwillbeableto- 1. UnderstandtheComments,JSPDocument,JSPEle ments.[2]* 2. ImplementthesimpleJSPapplication.[3]* 3. ExplaintheScopeandElExpressions.[2]* 4. DescribeWhatiswronginusingJSPScriptletTags. [2]* 5. UnderstandJSTLisacollectionofusefulJSPtags whichencapsulatesthecorefunctionalitycommontom anyJSPapplications.[2]*

		UnitV IntroductiontoEnterpriseJavabeans,WorkingwithSessionBeans,WorkingwithMessageDrivenBeans,Interceptors,JavaNamingandDirectoryInterface(NotionalHours10)	Thelearnerwillbeableto- 1. IllustrateEnterpriseBeanArchitecture.[3]* 2. ClassifyEJBisprimarilydividedintothreecategories.[2]* 3. ExplainworkingwithsessionBeans.[2]* 4. DescribehowJNDIprovidesconsistentuseofnamingand/ordirectoryservicesasaJavaAPI.[2]* 5. UnderstandtheJNDIis aJavaAPIwhichisusing byJavaapplicationstofindobjects.[2]*
		UnitVI Persistence,Object/RelationalMappingAndJPA,IntroductiontoJavaPersistenceAPI,WritingJPAApplication,IntroductiontoHibernate,WritingHibernateApplication (NotionalHours10)	Thelearnerwillbeableto- 1. ExplainPersistenceAPIprovidesJavadeveloperswithanobject/relationalmappingfacilityformanagingrelationaldatainJavaapplications.[2]* 2. UnderstandJPAApplication.[2]* 3. DescribehowtoHibernatehasalayeredarchitecturewhichhelpstheusertooperatewithouthavingtoknowtheunderlyingAPIs.[2]* 4. DiagrammaticallyexplainHibernateApplication Architecture.[4]* 5. IllustratetowriteHibernateApplication.[3]*

UGIT5P6	PRACTICAL SESSIONS	-	Thelearnerwillbeableto- 1. ImplementSimpleServletapplications.[3]* 2. ImplementServletapplicationswithCookiesandSessions.[3] 3. ImplementtheServletIOandFileapplications.[3]* 4. ImplementJSPapplications.[3]* 5. ImplementJSPJSTLandELApplications.[3]* 6. ImplementEJBapplicationswithdifferenttypesofBeans.[3]* 7. ImplementEJBapplicationswithdifferenttypesofBeans.[3]* 8. ImplementJPAapplications.[3]* 9. ImplementJPAapplicationswithORMandHibernate.[3]* 10. ImplementHibernateapplications.[3]*

CourseCode	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT507	NextGenerationTechnologies	UnitI**Big DataNoSQL IntroducingMongoDB** (NotionalHours:15)	Thelearnerwillbeableto- 1. ExplainBigDataanddifferentsourcesofBigData[2*] 2. CompareACIDvsBASE[5*] 3. ExplaintheCAPtheorem[2* 4. ListadvantagesanddisadvantagesofNoSQLdatabase[2*] 5. DiscussthechallengespossessedinBigData[2*] 6. ExplainV'sofBigData[2*] 7. ExplaindesignphilosophyofMongoDB[2*] 8. CompareSQLandNoSQLdatabases[4*] 9. Describenonrelationalapproach[2*] 10. ListapplicationsofBigData[1*] 11. CompareMongoDBandSQL[5*] 12. Justifyvolume,velocityandvarietyareimportantcomponentsofBigData[5*] 13. DiscusscategoriesofNoSQLdatabases[2*]

		UnitII **TheMongoDBDataModelUsingMongoDBShellMongoDBArchitecture**(NotionalHours:15)	Thelearnerwillbeableto- 1. WriteMongoDBqueries[3*] 2. WriteMongoDBcommandswithexamples[3*] 3. ExplainCappedCollection[2*] 4. ListandexplainconditionaloperatorsinMongoDB[2*]
			5. DescribethewaysdistributionofdatainshardingunderMongoDB 6. ExplaincorecomponentsofMongoDBpackage[2*] 7. ExplaintoolsavailableinMongoDB[2*] 8. Discussimportingdatainsharedenvironment[2*] 9. ExplaintheconceptInsertingbyExplicitlySpecifying_Id[2*] 10. Discussindexesanditstypes[2*] 11. DescribeDataDistributionProcess[2*] 12. ExplainBSON[2*] 13. Explainprocessofdeletingdocumentsinacollection[2*] 14. DifferentiatebetweenSingleKeyandCompoundIndex[4*] 15. Explainconceptofsharding[2*] 16. DescribeMaster/SlavereplicationinMongoDB[2*]
		UnitIII **MongoDBStorageEngineMongoDBUseCasesMongoDBLimitationsMongoDBBestPractices**(NotionalHours:15)	Thelearnerwillbeableto- 1. ExplainlimitationsofSharding[2*] 2. Discussfieldsusedforsharding[2*] 3. ExplainDatastorageengine,defaultstorageengineinMongoDB[2*] 4. CompareMMAPWiredTigerStorageEngines[4*] 5. ExplainindexesusedbyMongoDBtosupportlocation-basedqueries[2*] 6. ExplainJournalinganditsimportance[2*] 7. Describereplicationlog[2*] 8. DescribeGridFSMongoDBfilesystem[2*] 9. ExplainlimitationsofMongoDB[2*] 10. DiscusshardwarerequirementsforMongoDB[2*] 11. ExplainoperationsusedinMongoDB[2*] 12. ExplainlimitationsofIndexes[2*] 13. ExplainMonitoringServices[2*]
		UnitIV **TheEndofDisk** (NotionalHours15)	Thelearnerwillbeableto- 1. ExplainTimesTenArchitecture[2*] 2. ExplainSparkArchitecture[2*]

			3. ExplainOracle12cinmemorydatabases[2*] 4. ExplainDiskEconomics[2*] 5. ExplainIn-MemoryDatabase[2*] 6. ExplainuseofRedisindiskfilesforpersistence[2*] 7. DescribeBerkeleyAnalyticsDataStackanditscomponents[2*]
		UnitV **jQuery** (NotionalHours15)	Thelearnerwillbeableto- 1. WritejQueryCodes 2. CreateacustomeventusingjQuery[6*] 3. DescribejQueryCSSmethod[2*] 4. ListfeaturesofjQuery[1*] 5. DescribeAjax,itsusesandincorporationwithjQuery[2*] 6. AddingandremovingelementstoDOMinjQuery[3*] 7. WritejQueryCodetoaddaCSSclasstoHTMLelements[3*] 8. ExplainfeaturesofjQuery[2*] 9. ExplainjQueryDOMFilterMethods[2*] 10. ExplainEventsandEventHandlinginjQuery[2*]
		UnitVI **JSON** (NotionalHours15)	Thelearnerwillbeableto- 1. Explainjson_encodeandjson_decodefunctions[2*] 2. ExplainXTHMLHttpRequestEventHandlers[2*] 3. DescribeStringifyFunction[2*] 1. ExplainJSONarrarys[2*] 4. ExplainmethodsofCraddleWrapper[2*] 5. AssessJSONandXML[5*] 6. ExplainJSONDatatypes[2*] 7. DiscussJSONSchemawithValidationLibraries[2*] 8. ExplainencodinganddecodingJSONinPython[2*] 9. ExplainJSONGrammar[2*] 10. DescribePersistingJSON[2*] 11. ExplainJSONParsing[2*] 12. DiscussJSON Values[2*]

UGIT5P7	NextGeneratio nTechnologies PRACTICALS	-	Thelearnerwillbeableto: 1. WritebasicMongoDBQueries[3*] 2. WritesimplequerieswithMongoDB[3*] 3. ImplementAggregation[3*] 4. Replicate,backupandrestoredatabase[3*] 5. ConnectJavawithMongoDB[3*] 6. ConnectPHPwithMongoDB[3*] 7. ConnectPythonwithMongoDB[3*] 8. WriteprogramsonbasicjQuery[6*] 9. WriteprogramsusingadvancedjQuery[6*] 10. Create,ParseandPersistJSON[6*] 11. CreateJSONfileandimportittoMongoDB[6*]

CourseCode	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT602	SecurityInComputing	UnitI InformationSecurityOverview,RiskAnalysisandSecureDesign Principles (NotionalHours:15)	1. StudentwillunderstandtheneedofInformationProtection. 2. ToAnalysisofriskAssociatedwithinformation. 3. StudentwillabletounderstandTypesofAttacksinNetworking. 4. StudentwillabletodesignSecuritybyusingCIAtraid. 5. StudentwillabletodifferentiatebetweenLollipopandOnionModel.
		UnitIIAuthentication andAuthorization, EncryptionandStorageSecurity (NotionalHours:15)	1. TounderstandtheconceptofAuthenticationandAuthorization. 2. ToanalysedifferencebetweenAuthenticationandAuthorization. 3. ToImplementingsecuritybyusingEncryptionConcept. 4. TocompareAuthenticationandAuthorization. 5. Tounderstandtheconceptofstoragesecurity.
		UnitIII DatabaseSecurity,SecureNetwork DesignandNetworkDeviceSecurity (NotionalHours:15)	1. ToanalyseneedofDatabasesecurity. 2. StudentwillabletoimplementDatabaseSecurity. 3. TounderstandtheconceptofDMZ 4. Tostudyhowtoapplysecurenetworkdesign. 5. TounderstanddifferencebetweenHub,switchandRouter.
		UnitIV FirewallsandWireless networksecurity	1. TounderstandthreedifferentGenerationsoffirewall. 2. Tounderstandtherequirementofwirelessnetworksecurity. 3. Tounderstanddifferenttypesofantennaandtheirneeds.
		(NotionalHours15)	4. ToanalysewirelessNetworking 5. TounderstandtheuseofNAT(NetworkAddressTranslation). 6. TodifferentiateStaticNATandDynamicNAT

		UnitV IntrusionDetectionandPreventionSystem, VoiceoverIP(VoIP)andPBXSecurityand OperatingSystemSecurity Models	1. TounderstandhowtouseIntrusionDetectionandpreventionsystem toprotecttheData. 2. ToanalysingHostbasedIDSandNetworkbasedIDS. 3. TounderstandtheneedofVoIPConcept 4. ToanalysedifferentComponentofVoIP. 5. StudentwillabletoapplyOperatingSystemSecurityModel
		UnitVI VirtualMachinesandCloudComputing, SecureApplicationDesignAndPhysicalSecurity	1. TounderstandtheuseofVirtualMachineandCloudComputing. 2. StudentwillabletodesignSecureApplication. 3. Studentwillabletounderstandrequirementof PhysicalSecurity.
UGIT602	PRACTICALSESSIONS	-	1. StudentwillbeabletoimplementtheAAAAuthentication. 2. StudentwillbeabletoConfigure,ApplyandVerifyanExtendedNumberedACL. 3. StudentwillbeabletoConfigureIPACLstoMitigateAttacksandIPV6ACLs. 4. StudentwillbeabletounderstandandimplementaZone-Based PolicyFirewall 5. StudentwillbeabletoimplementLayer2Security. 6. Studentwillabletounderstand,designandImplementASABasicsettingandfirewallusingCLI.

CourseCode	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT602	SecurityInComputing	UnitI InformationSecurityOverview,RiskAnalysisandSecureDesign Principles (NotionalHours:15)	1. StudentwillunderstandtheneedofInformationProtection. 2. ToAnalysisofriskAssociatedwithinformation. 3. StudentwillabletounderstandTypesofAttacksinNetworking. 4. StudentwillabletodesignSecuritybyusingCIAtraid. 5. StudentwillabletodifferentiatebetweenLollipopandOnionModel.
		UnitIIAuthentication andAuthorization, EncryptionandStorageSecurity (NotionalHours:15)	1. TounderstandtheconceptofAuthenticationandAuthorization. 2. ToanalysedifferencebetweenAuthenticationandAuthorization. 3. ToImplementingsecuritybyusingEncryptionConcept. 4. TocompareAuthenticationandAuthorization. 5. TounderstandtheconceptofstorageSecurity.

		UnitIII DatabaseSecurity,SecureNetwork DesignandNetworkDeviceSecurity (NotionalHours:15)	1. ToanalyseneedofDatabasesecurity. 2. StudentwillabletoimplementDatabaseSecurity. 3. TounderstandtheconceptofDMZ 4. Tostudyhowtoapplysecurenetwork Design. 5. TounderstanddifferencebetweenHub,switchandRouter.
		UnitIV FirewallsandWireless networksecurity	1. TounderstandthreedifferentGenerationsoffirewall. 2. Tounderstandtherequirementofwirelessnetworksecurity. 3. Tounderstanddifferenttypesofantennaandtheirneeds.
		(NotionalHours15)	4. ToanalysewirelessNetworking 5. TounderstandtheuseofNAT(NetworkAddressTranslation). 6. TodifferentiateStaticNATandDynamicNAT
		UnitV IntrusionDetectionandPreventi onSystem, VoiceoverIP(VoIP)andPBXSecuri tyand OperatingSystemSecurity Models	1. TounderstandhowtouseIntrusionDetectionandpreventionsystem toprotecttheData. 2. ToanalysingHostbasedIDSandNetworkbasedIDS. 3. TounderstandtheneedofVoIPConcept 4. ToanalysedifferentComponentofVoIP. 5. StudentwillabletoapplyOperatingSystemSecurityModel
		UnitVI VirtualMachinesandCloudComput ing, SecureApplicationDesignAndP hysicalSecurity	1. TounderstandtheuseofVirtualMachineandCloudComputing. 2. StudentwillabletodesignSecureApplication. 3. Studentwillabletounderstandrequirementof PhysicalSecurity.
UGIT602	PRACTICALSESSI ONS	-	1. StudentwillbeabletoimplementtheAAAAuthentication. 2. StudentwillbeabletoConfigure,ApplyandVerifyanExtendedNumbere dACL. 3. StudentwillbeabletoConfigureIPACLstoMitigateAttacksandIPV6A CLs. 4. Studentwillbeabletounderstandandimplementa Zone-Based PolicyFirewall 5. StudentwillbeabletoimplementLayer2Security. 6. Studentwillabletounderstand,designandImplementASABasicsettinga ndfirewallusingCLI.
CourseCod e	**CourseTitle**	**Unittitle**	**LearningOutcomes**

UGIT602	SecurityInComputing	UnitI InformationSecurityOverview,RiskAnalysisandSecureDesign Principles (NotionalHours:15)	1. StudentwillunderstandtheneedofInformationProtection. 2. ToAnalysisofriskAssociatedwithinformation. 3. StudentwillabletounderstandTypesofAttacksinNetworking. 4. StudentwillabletodesignSecuritybyusingCIAtraid. 5. StudentwillabletodifferentiatebetweenLollipopandOnionModel.
		UnitIIAuthentication andAuthorization, EncryptionandStorageSecurity (NotionalHours:15)	1. TounderstandtheconceptofAuthenticationandAuthorization. 2. ToanalysedifferencebetweenAuthenticationandAuthorization. 3. ToImplementingsecuritybyusingEncryptionConcept. 4. TocompareAuthenticationandAuthorization. 5. TounderstandtheconceptofstorageSecurity.
		UnitIII DatabaseSecurity,SecureNetwork DesignandNetworkDeviceSecurity (NotionalHours:15)	1. ToanalyseneedofDatabasesecurity. 2. StudentwillabletoimplementDatabaseSecurity. 3. TounderstandtheconceptofDMZ 4. TostudyhowtoapplysecurenetworkDesign. 5. TounderstanddifferencebetweenHub,switchandRouter.
		UnitIV FirewallsandWireless networksecurity	1. TounderstandthreedifferentGenerationsoffirewall. 2. Tounderstandtherequirementofwirelessnetworksecurity. 3. Tounderstanddifferenttypesofantennaandtheirneeds.
		(NotionalHours15)	4. ToanalysewirelessNetworking 5. TounderstandtheuseofNAT(NetworkAddressTranslation). 6. TodifferentiateStaticNATandDynamicNAT
		UnitV IntrusionDetectionandPreventionSystem, VoiceoverIP(VoIP)andPBXSecurityand OperatingSystemSecurity Models	1. TounderstandhowtouseIntrusionDetectionandpreventionsystem toprotecttheData. 2. ToanalysingHostbasedIDSandNetworkbasedIDS. 3. TounderstandtheneedofVoIPConcept 4. ToanalysedifferentComponentofVoIP. 5. StudentwillabletoapplyOperatingSystemSecurityModel
		UnitVI VirtualMachinesandCloudComputing, SecureApplicationDesignAndPhysicalSecurity	1. TounderstandtheuseofVirtualMachineandCloudComputing. 2. StudentwillabletodesignSecureApplication. 3. StudentwillabletounderstandrequirementofPhysicalSecurity.

UGIT602	PRACTICALSESSIONS	-	1. StudentwillbeabletoimplementtheAAAAuthentication. 2. StudentwillbeabletoConfigure,ApplyandVerifyanExtendedNumberedACL. 3. StudentwillbeabletoConfigureIPACLstoMitigateAttacksandIPV6ACLs. 4. StudentwillbeabletounderstandandimplementaZone-Based PolicyFirewall 5. StudentwillbeabletoimplementLayer2Security. 6. Studentwillabletounderstand,designandImplementASABasicsettingandfirewallusingCLI.

Course Code	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT604	Principleof Geographic Information System	UnitI **A Gentle Introduction toGIS GeographicInformationand SpatialDatabase** (NotionalHours:12)	Thelearnerwillableto: 1. DescribewhatgeographyandGIS.[2]* 2. Distinguishbetweenmodelandmap.[4]* 3. Understandthemeaningofthegeographicphenomenon,geographicfields,geographicobjects,andboundaries..[2]* 4. Recognizingdifferentaspectsofcomputerrepresentationof geographicinformation..[2]* 5. Definingthetemporaldimension..[2]*
		UnitII **Data Management andProcessingSystems** (NotionalHours:12)	1. DefiningtheGISsoftware,GISArchitecture,andfunctionality,Spatialinfrastructuredata.[2]* 2. Diagrammaticallyrepresentingthestagesofspatialdatahandling.[3]* 3. ThereasoningforusingaDBMS.[5]* 4. Applytoqueryonspatialdatabase..[3]*
		Unit III **Spatial Referencing andPositioning** (NotionalHours:06)	1. DefiningReferencesurfacesformapping.[2]* 2. DiagrammaticallyexplaindifferenttypesofCoordinateSystems.[4]* 3. DiagrammaticallyexplainMapProjections,CoordinateTransformations.[4]* 4. Describingthemeaningofabsolutepositioning,network
			positioning,relativepositioning[2]* 5. Comparepositioningtechniques[4]*

		UnitIV **DataEntryandPreparation** (NotionalHours06)	1. IdentifythedifferentwaysofDirectspatialdatacapture,Indirectspatialdatacapture.[2]* 2. Recognizingdifferenttermsrelatedtothedataqualityofgeographic information.[2]* 3. Diagrammaticallyexplaindatachecksandrepairs.[4]* 4. Definingpointdatatransformation.[2]*
		UnitV **SpatialDataAnalysis** (NotionalHours15)	Thelearnerwillableto: 1. Diagrammaticallyexplainthemeasurementofvectorandrasterdata.[4]* 2. Applyingoverlayoperationonvectorandrasterdata.[3]* 3. Describingthedifferentaspectofneighbourhoodfunction.[2]* 4. IdentifythemeaningofGPSandGISapplication.[2]* 5. DiagrammaticallyexplainerrorPropagationinthespatialdataprocessing.[4]*
		UnitVI **DataVisualization** (NotionalHours15)	Thelearnerwillableto: 1. IdentifytherelationbetweenGISandMap.[2]* 2. Describingthevisualizingprocessandcartographictoolbox.[2]* 3. Diagrammaticallyexplainhowtomapqualitativedata,quantitativedata,howtomaptimeseries[4]* 4. IdentifythemeaningofGPSandGISapplications.[2]* 5. ApplyingMapCosmeticstodrawingmap[3]* 6. Definingthemeaningof MapDissemination[2]*
UGIT6P4	PRACTICAL SESSIONS	-	1. CreatingandManagingVectorData:Addingvectorlayers,settingproperties,formatting,calculatinglinelengthsandstatistics.[3]* 2. ExploringandManagingRasterdata:Addingrasterlayers,rasterstyling,andanalysis,rastermosaickingandclipping.[3]* 3. MakingaMap,WorkingwithAttributes,ImportingSpreadsheetsorCSVfiles,UsingPlugins,SearchingandDownloading

			OpenStreetMapData.[3]* 4. Workingwithattributes,terrainDataandhillshadeanalysis[3]* 5. WorkingwithProjectionsandWMSData[3]* 6. GeoreferencingTopoSheetsandScannedMapsandGeoreferencingAerialImageryandDigitizingMapData.[3]* 7. ManagingDataTablesandSpatialdataSets:Tablejoins,spatial joins,pointsinpolygonanalysis,performingspatialqueries.[3]* 8. PerformingAdvancedGISOperations1:NearestNeighbourAnalysis,SamplingRasterDatausingPointsorPolygons,Interpolating PointData.[3]* 9. PerformingAdvanceGISOperations2:BatchProcessingusing ProcessingFrameworkAutomatingComplexWorkflowsusingProcessingModeller,AutomatingMapCreationwithPrintComposerAtlas.[3]* 10. ValidatingMapdata.[3]*

Course Code	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT606	ITServiceManagment	UnitI Introduction,ServiceStrategyPrinciples(NotionalHours:6)	Thelearnerwillbeableto- 1. DescribingtheWhatisservicemanagement?Whatareservices?.[1]* 2. IdentifyBusinessProcess,PrinciplesofServicemanagement.[2]* 3. UnderstandingtheLifecycleStages.[2]* 4. ExplainingValuecreation,ServiceAssets,ServiceProvider,ServiceStructures,ServiceStrategyPrinciples.[2]* 5. DiscussonServiceStrategy.[2]*
		UnitII Challenges,CriticalSuccessfactorsandrisks,ServiceDesign (NotionalHours:12)	Thelearnerwillbeableto- 1. DefinetheComplexity,CoordinationandControl,Preservingvalue,Effectivenessinmeasurement,Risks.[2]* 2. ExplainingFundamentals,ServiceDesignPrinciples[2]* 3. IdentifyingServicerequirementsanddocumentingbusinessrequirementsanddrivers.[2]* 4. DescribingtheDesignactivities,Designaspects,Subsequent designactivities,Designconstraintst.[1]* 5. UnderstandtheServiceorientedarchitecture,BusinessServiceManagement,ServiceDesignModels[2]*

		UnitIII ServiceDesignProcesses,Challenges,CriticalSuccessfactorsandrisks,ServiceTransition(NotionalHours:6)	Thelearnerwillbeableto- 1. ListingServiceDesignProcesses,Challenges.[1]* 2. DiagrammaticallyexplainServiceDesignProcesses,ServiceTransition.[4]* 3. IdentifyuseandevaluateChallenges,Risks.[2]* 4. Understandtheprocessmanagementpoliciesandschedulingofprocesses byCPU[2]* 5. RecognisethemeaningofFundamentals,ServiceTransitionPrinciples.[2]*
		UnitIV ServiceTransitionProcesses,Challenges,CriticalSuccessfactors,Risks (NotionalHours12)	Thelearnerwillbeableto- 1. ListingServiceTransitionProcesses.[1]* 2. ExplainingTransitionplanningandsupportChangeManagemen.[2]* 3. DicussonServiceAssesConfigurationManagement,ServiceandDeploymentManagement,ServiceValidationandTesting,Evaluation,KnowledgeManagement.[2]* 4. UnderstandtheChallenges,CriticalSuccessfactors,Risks,ServiceTransitionunderdifficultConditions.[2]*
		UnitV ServiceOperation,ContinualServiceImprovement(CSI)Principles,CSIProcess (NotionalHours12)	Thelearnerwillbeableto- 1. RecognisetheFactorstobeconsideredinServiceOperation.[2]* 2. Reviewandanalyzeimprovementopportunitiesineach lifecyclephase.[3]* 3. ReviewandanalyzeServiceLevelachievementresults.[2]* 4. ImprovecosteffectivenessofdeliveringITserviceswithoutsacrificingcustomersatisfaction.[2]* 5. IdentifyandimplementindividualactivitiestoimproveITservicequality.[2]*
			6. Ensuresapplicablequalitymanagementmethodsareusedtosupportcontinualimprovementactivities.[3]*

		UnitVI CSIMethodsnadTechniques,OrganisingforCSI,Technologyconsiderations,ImplementingCSI(NotionalHours12)	Thelearnerwillbeableto- 1. Describingwhentouseassessments,whattoassessandhowagapanalysiscanprovideinsightintotheareasthathaveroomforimprovement.[1]* 2. Discussthehowtousebenchmarking,servicemeasurement, metrics,servicereporting,includingbalancedscorecardandSWOT,tosupportCSI.[2]* 3. Understandhowtocreateareturnoninvestment,establishabusinescaseandmeasurethebenefitsachieved.[2]* 4. Ensureshowtechniqueswithinavailabilitymanagement, capacitymanagement,ITservicecontinuitymanagementandproblemmanagementcanbeusedbyCSI.[2]* 5. Understandtheknowledge,interpretation,andanalysisofimprovementprinciples,techniques,andrelationships,andtheirapplicationtoensurecontinualserviceimprovement.[2]* 6. KnowabouttheroleoftheCSImanager,andtherolesofserviceowner,processowner,processmanagerandprocesspractitionerinthecontextofCSIandhowtheycanbepositionedwithinanorganization [1]*
UGIT3P5	PRACTICAL SESSIONS	-	Thelearnerwillbeableto- 1. PerformingIntroductiontoAndroid,IntroductiontoAndroidStudioIDE,ApplicationFundamentals.[3]* 2. PerformProgrammingResources-AndroidResources:(Color,Theme,String,Drawable,Dimension, Image).[3]* 3. PerformProgrammingActivitiesandfragments-

			fragmentsandmultiplefragments.[3]* 4. PerformProgramsrelatedtodifferentLayoutsCoordinate,Linear,Relative,Table,Absolute,Frame,ListView,GridView.[3]* 5. PerformProgrammingUIelements-AppBar,Fragments,UI Components.[3]* 6. PerformProgrammingmenus,dialog,dialogfragments.[3]* 7. PerformProgramsonIntents,Events,ListenersandAdapters-TheAndroidIntentClass,UsingEventsandEventListeners.[3]* 8. PerformProgramsonServices,notificationandbroadcastreceivers.[3]* 9. PerformDatabaseProgrammingwithSQLite.[3]* 10. PerformProgrammingthreads,handlesandasynchronizedprograms.[3]* 11. PerformProgrammingMediaAPIandTelephoneAPI.[3]* 12. PerformProgrammingSecurityandpermissions.[3]* 13. PerformProgrammingNetworkCommunicationsandServices(JSON).[3]*

Course Code	**CourseTitle**	**Unittitle**	**LearningOutcomes**
UGIT607	CyberLaws	UnitI PowerofArrestWithoutWarrantUndertheITAct,2000, CyberCrimeandCriminalJustice:Penalties,AdjudicationandAppealsUndertheITAct,2000 (NotionalHours:10)	Thelearnerwillbeableto- 1. DescribePowerofArrestWithoutWarrantUndertheITAct,2000.[2]* 2. CompareandcontrastbetweenCognizableandNon-CognizableOffences.[4]* 3. Understand‘abouttocommit’isusedinsection80.[2]* 4. Explaintheconceptof‘CyberCrime’andtheItAct,2000.[2]* 5. UnderstandtheconceptofStrategiestoTackleCyber CrimeandTrends.[2]*

		UnitII ContractsintheInfoTechWorld,Jurisdictionin theCyberWorld(NotionalHours:10)	Thelearnerwillbeableto- 1. UnderstandtheContractintheInfoTechworld.[2]* 2. CompareClick-WrapandShrink-WrapContract.[4]* 3. UnderstandContractFormationUndertheIndianContractAct,1872.[2]* 4. DescribeJurisdictionandtheInformationTechnology Act,2000.[2]* 5. SummarisetheLegalPrinciplesonJurisdictionintheUnitedStateofAmerica.[2]*
		UnitIII BattlingCyberSquattersandCopyrightProtectionintheCyberWorld.(NotionalHours:10)	Thelearnerwillbeableto- 1. ExplainConceptofDomainNameandReplytoCyberSquatters,Meta-Tagging.[2]* 2. DistinguishTheBattleBetweenFreedomandControlontheInternet.[4]* 3. DescribeCopyrightOwnershipandAssignment,LicenseofCopyright.[2]* 4. UnderstandCopyrightProtectionofContentontheInternet.[2]* 5. AnalysetheNapsteranditsCousins:ARevolutiononthenetbutaCrisisforCopyrightOwners.[4]*
		UnitIV E-CommerceTaxation:RealProblemsintheVirtualWorld, DigitalSignature,CertifyingAuthoritiesandE-Governance (NotionalHours10)	Thelearnerwillbeableto- 1. DescribeATugofWarontheConceptof‘PermanentEstablishment’.[2]* 2. ExplaintheLawofDoubleTaxationAvoidanceAgreementsandTaxableJurisdictionOverNon-Residents.[2]* 3. UnderstandtheTaxationPoliciesinIndia.[2]* 4. DescribetheconceptofDigitalSignatures,DigitalSignatureCertificate.[2]* 5. UnderstandtheE-GovernanceinIndia.[2]*

		UnitV TheIndianEvidenceActof1872v.InformationTechnologyAct,2000. (NotionalHours10)	Thelearnerwillbeableto- 1. UnderstandtheStatusofElectronicRecordsasEvidence.[2]* 2. DescribetheAdmissibilityandProbativeValueofE-Evidence.[2]* 3. DescribetheAmendmentsintheIndianEvidenceActbytheITAct.[2]*
			4. DescribeAmendmentstotheBankersBooksEvidenceAct,1891.[2]* 5. UnderstandtheReserveBankofIndiaAct,1934.[2]*
		UnitVI ProtectionofCyberConsumersinIndia (NotionalHours10)	Thelearnerwillbeableto- 1. DescribeGoodsandServices.[2]* 2. ExplaintheDefectinGoodsandDeficiencyinServices.[2]* 3. IllustratetheInstancesofUnfairTradePractices.[3]* 4. ExplaintheBewareConsumers.[2]* 5. UnderstandtheApplicabilityofCPAtoManufacturers.[2]* 6. UnderstandtheAmendmentsinIndianITAct2000.[2]*
UGIT6P7	PRACTICALSESSIONS	-	Thelearnerwillbeableto- 1. StudytheconceptofIntroductiontoAndroid,IntroductiontoAndroidStudioIDE,ApplicationFundamentals.[3]* 2. ImplementconceptofResources.[3]* 3. ImplementconceptofActivitiesandfragments.[3]* 4. ImplementconceptrelatedtodifferentLayouts.[3]* 5. ImplementconceptofUIelements.[3]* 6. Implementconceptofmenus,dialog,dialogfragments.[3]* 7. ImplementconceptofIntents,Events,ListenersandAdapters.[3]* 8. ImplementconceptofServices,notificationandbroadcastrecievers.[3]* 9. DesigntheDatabaseProgrammingwithSQLite[6]* 10. Implementconceptofthreads,handlesandasynchronized

			programs.[3]* 11. ImplementconceptofMediaAPIandTelephoneAPI.[3]* 12. ImplementconceptofSecurityandpermissions.[3]* 13. ImplementconceptofNetworkCommunicationsandServices.[3]*

***Note:[1]:Remembering,[2]:Understanding,[3]:Applying,[4]:Analysing,[5]:Evaluating,[6]:Creating**

Sr. No	Course Code	Name of Course Coordinator	Signature
		SEM I	
1	UGIT101	ASIFA HAWA	
2	UGIT102	POONAM RAWALE	
3	UGIT103	MANISHA JANGALE	
4	UGIT104	MADHURI GABHANE	
5	UGIT105	SNEHA MHATRE	
6	UGIT106	SWATI GAIKWAD	
		SEM II	
7	UGIT201	HARSHA GORDE	
8	UGIT202	SAMIKSHA SURYAWANSHI	
9	UGIT203	VARSHA IRALAPALLE	
10	UGIT204	SNEHA MHATRE	
11	UGIT205	MANISHA JANGALE	
12	UGIT206	POONAM RAWALE	
		SEM III	
13	UGIT301	HARSHA GORDE	
14	UGIT302	MADHURI GABHANE	
15	UGIT303	MANOJ CHOUDHARY	
16	UGIT304	ASIFA HAWA	
17	UGIT305	AJAY BANSODE	
18	UGIT306	SWATI GAIKWAD	
		SEM IV	
19	UGIT401	MANISHA JANGALE	
20	UGIT402	MANOJ CHOUDHARY	
21	UGIT403	MADHURI GABHANE	
22	UGIT404	SWATI GAIKWAD	
23	UGIT405	VARSHA IRALAPALLE	
24	UGIT406	AJAY BANSODE	

		SEM V	
25	UGIT501	MANOJ CHOUDHARY	
26	UGIT502	MANISHA JANGALE	
27	UGIT503	HARSHA GORDE	
28	UGIT504	SAMIKSHA SURYAWANSHI	
29	UGIT505	POONAM RAWALE	
30	UGIT506	ASIFA HAWA	
31	UGIT507	VARSHA IRALAPALLE	
		SEM VI	
32	UGIT601	AJAY BANSODE	
33	UGIT602	ASIFA HAWA	
34	UGIT603	POONAM RAWALE	
35	UGIT604	SAMIKSHA SURYAWANSHI	
36	UGIT605	MANISHA JANGALE	
37	UGIT606	MANOJ CHOUDHARY	
38	UGIT607	VARSHA IRALAPALLE	

PROGRAM COORDINATOR **BOS CHAIRMAN** **PRINCIPAL**

VASHI NAVI MUMBAI