**CSC3205CompilerDesign**

(a)Description

Inthiscourseunit,

Students shall under stand thecompleteprocess oftranslatingaprograminahigh-levellanguagetomachinelanguage. Thecoursegivesanintroductiontothedesignandimplementation ofa compilerwithemphasisonprinciplesandtechniquesfor programanal- ysisandtranslation.Italsogivesanoverviewofthetoolsforcompiler construction. Lexicalanalysis,tokenselection,transitiondiagrams, andfiniteautomata.Theuseofcontext-freegrammarstodescribe syntax,derivationsofparsetrees,andconstructionofparsers.Syntax- directedtranslationschemes;Intermediatecode;Symboltable;Code generation;Detection,reporting,recoveryandcorrectionoferrors.

(b) Aims

Theaimofthecourseistoallowstudentstoexaminehowahigh-level languageprogramisaccepted asinputandtranslatedintoassembly languageormachine languagesothatthecentralprocessingunitre- ceivesinstructionswhichitunderstandsandcanexecute.

(c)TeachingandLearningpattern

Thecourseconsistsofatraditionaltheoreticalcomponentandaproject component.Thelecturecomponentintroducesthebasicconceptsof compilerwriting.Theprojectcomponentwillinvolvestudentsinwrit- ingacompilerforaspecifiedprogramminglanguage.

(d) Indicativecontent

*•*Languagetranslators: Introductiontocompilersandinterpreters.

*•*Thestructureofacompiler:lexicalanalysis,parsing,semantic analysis.

*•*Intermediatecodegeneration,registerallocation, globaloptimiza- tion.

*•*Lexicalscanning

*•*Parsing

*•*Automaticparserconstruction.FIRSTandFOLLOWfunctions.

LL(1)parsers.LRparsers.ConflictsinLRgrammarsandhowto resolvethem

*•*Semanticanalysis:Attributesandtheircomputation,tree-traversals, visibility andnameresolution.Inheritedattributesandsymbol tables.Nameresolutioninblock-structuredlanguages

*•*Typechecking:Typesystems,varieties ofstrongtyping,over- loadresolution,polymorphismanddynamicdispatching.Type- checkingandtypeinference,unification

*•*Run-timeorRun-timeorganization:storageallocation,non-local references,parameterpassing,dynamicstorageallocation.Excep- tionhandling,debugginginformation

*•*Intermediatecodegeneration: controlstructures, expressions,sim- pleregisterallocation.Aggregatesandotherhigh-levelconstructs

*•*Globaloptimization

(e)Assessmentmethod

Assessmentwillbe byassignmentsand/or tests(40%)andwritten examination(60%)

(f)Reading list

(i) CompilerconstructionbyWilliam McCastlineWaite, Gerhard

GoosSpringerVerlag1994