**Unit**e **4**e **Assignment**e **1**

**P1**e **Explain**e **how**e **computation**e **thinking**e **skills**e **are**e **applied**e **in**e **finding**e **solutions**e **that**e **can**e **be**e **interrupted**e **into**e **software**e **applications.**

Computationale thinkinge referse toe thee processe ofe framinge problemse ande theire solutionse ine ae waye thate cane bee executede bye ae computer.e Thise approache involvese addressinge issuese frome ae computere sciencee perspectivee ande usinge specifice skillse ande techniquese toe solvee problems.e Keye elementse ofe computationale thinkinge include:

1. **Algorithmice Thinking**:e Creatinge ae step-by-stepe proceduree ore algorithme toe solvee ae problem.
2. **Decomposition**:e Breakinge downe ae complexe probleme intoe smaller,e moree manageablee components.
3. **Patterne Recognition**:e Identifyinge patternse ore similaritiese withine ande betweene problems.
4. **Abstraction**:e Concentratinge one thee essentiale detailse ande ignoringe thee irrelevante ones.
5. **Patterne Generatione ande Generalization**:e Developinge modelse ore templatese thate cane addresse multiplee similare problems.

Thesee skillse aree cruciale fore effectivee problem-solvinge ine variouse fields,e note juste computere science.e Bye applyinge computationale thinking,e individualse cane systematicallye tacklee challengese ande devisee efficiente solutions.

**Decomposition**

Decompositione involvese managinge complexe problemse bye breakinge theme downe intoe smaller,e simplere partse ande identifyinge patternse withine thesee components.e Whene ae probleme ise largee ande intricate,e decompositione makese ite moree manageablee bye isolatinge subprogramse thate cane bee examinede ande solvede independently.e Thise approache leadse toe moree modulare ande maintainablee code,e whiche ise essentiale fore effectivee programming.

Thee firste stepe ine decompositione ise toe breake ae systeme downe intoe itse individuale components.e Thesee smallere partse aree thene usede toe constructe thee largere system,e combininge theme toe forme ae cohesivee structure.e Eache smallere functionale unite performse specifice functionse ande tasks,e ae processe knowne ase functionale decomposition.e Structurale decomposition,e one thee othere hand,e involvese dividinge thee systeme intoe basice unitse likee classes,e objects,e ande modules.e Thise methode enhancese thee system'se modularitye ande simplicity,e makinge ite easiere toe develope ande maintain.

**Real**e **Life**e **scenario**

Thee novele ise dividede ine 3e partse bye beginning,e middlee ande ende bye startinge toe breake thee modele downe intoe ae componente parte whiche toe analysee eache onee toe separatelye frome ane ordere toe usee decompositione strategye toe bee summarisede it.e e e Fore breakinge downe thee plote one ae liste ofe keye eventse one theire significancee ine ae storye frome thee beginning,e middlee ande ende likee Englishe toe seee thee illustration.

**Data**e **abstraction**

Thee fundamentale idease ofe datae abstraction,e whiche entailse concentratinge one thee essentiale componentse ofe thee datae ande informatione bye ignoringe thee extraneouse details.e Datae Abstractione toe referse fore hidinge extraneouse informatione ande concentratinge ine thee model’se essentiale thee informatione ine thee ordere ofe presente toe ae bettere solutione ine ane issuee frome thee simplifye situatione toe improvee thee understanding.e Computere Sciencee ise expectede toe usee thee datae abstraction,e ranginge frome thee basice datae structuree thee toole efficientlye toe managee thee massivee amountse ofe datae ande thee lowe systeme complexitye one thee differente levelse ofe datae abstraction,e rangee ofe basicse ofe datae structurese suche ase arrayse ande pointerse toe complexe conceptse likee interfaces,e objecte ande classes.e Fore eache levele ofe abstractione offerse thee differente levele ine ae detaile ine thee functionalitye toe dependse one thee neede ine softwaree systems.e

Datae abstractione ise thee computere sciencee ande programminge worldse toe enablese thee developerse toe createe ande makee thee systemse ande thee applicationse toe macke highe levele ofe abstraction.e Ite alsoe cane bee enablese one softwaree developerse toe focuse ande learnte aboute whate theye aree developinge thane gettinge thee sidee trackede bute ite ise note importante backgrounde information.e e Thee fundamentale concepte ofe computere sciencee callede datae abstractione toe bee enablese programmerse frome creatinge thee abstractione representationse fore complexe systemse ande datae structurese thise ise leade fore moree reusablee ande thee maintainablee codee evene toe makee thee designse toe implantatione one systemse softwaree toe bee muche easier.

**Pattern**e **recognition.**

Toe finde thee patternse ande similaritiese ine datae ande beene usede theme toe informe thee decisionse whiche ise alsoe knowne ase patterne recognition.e Thee capacitye cane enablee theme toe recognitione thee complexe patternse ine complexe datae toe analysee ande sortinge thee largee amounte ofe datae frome thee computatione thinkinge toe usee thee patternse recognitionse toe finde thee solutione ae varietye ofe issues.e Patterne recognitione ise thee abilitye toe seee recurringe attributese withe thee samee problemse ande thee differente betweene ae problem.e Ite doese havee numerouse applicationse one thee varietye one othere fielde ande thee offerse whiche ise importante insighte one thee difficulte problemse ande issues.e Thise wase repeatede thee patternse cane makee thee probleme solvinge ite ise muche easiere ande toe providee ae goode placee toe thee startinge point.

Reale scenario-e Toe identificatione ande authorizatione thise maye moreovere bee usede fore faciale acknowledgmente ande uniquee marke toe urgee anye othere designse ofe othere individualse ande fore thee individual.e Thise figuree appearse ae designe ofe twoe comparativee fingerprints.

**Pattern**e **Generalization**

Patterne Generalizatione ise thee processe toe identifye thee similaritiese amonge thee patternse one ordere toe createe thee generale solutionse toe usee toe solvee numerouse problemse ande ite alsoe processe toe finde ae structuree one patterne toe bee sete ofe datae ore algorithmice operationse toe usee thee structuree one toe createe thee moree generale algorithme ore functionse thate cane bee appliede one widee rangee ofe thee datae ore thee situations.e Ine Mathematicale ande computationale thinkinge toe bee requirede one thee capacitye toe generalisee thee patternse toe involvee one havinge abilitye toe recognisee thee patterns

**Algorithmic**e **thinking**e **skills**

Thee reasone ofe algorithmice consideringe ise toe assiste ande illuminatee ae particulare issuee ore errand.e Anothere keye datae ore reasone almoste algorithmice consideringe abilitiese ise toe appeare thate deterioratione ande reflectione ande designe acknowledgmente alle havee onee enormouse meaninge whene ite comese toe algorithmice consideringe abilities,e usuallye moreovere ae keye componente ofe computationale thinking.   
  
  
  
Algorithmice consideringe cane alsoe incorporatee thee methode ofe breakinge downe ae hugee issuee toe createe ite moree reasonablee ande simplere toe fathom.e Algorithmice thinkinge ise additionallye ae waye toe unravele littlere ande greatere assignmente toe createe thee issuee muche easiere toe fathom,e thise wille moreovere bee ae keye fore ane individuale toe fathome thee issuee ande utilizee theree computationale consideringe abilitiese toe breake downe ane issue.e Algorithmice thinke ise additionallye ae reasone toe analysee specifice complexe information,e thise moreovere incorporatese understandinge thee moste probleme ande understandinge whate criticale expertisee ise requirede fore thise issue.e Itse continuouslye criticale toe thinke almoste thee kinde ofe viewpointse thate aree loste withine thee issuee thate oughte toe bee illuminatede ande supplanted.e Thise terme cane moreovere bee ae buildinge squaree toe createe ite ae completione whene tacklinge troublesomee issuee ande toe createe ae compellinge arrangee toe makee beyonde anye doubte thee yielde ofe thee resulte ise adjuste whilee tacklinge thee issue.

**Automation**e

Automatione ise thee contexte ofe computationale thinkinge thate cane bee processede bye takinge modelse ande puttinge solutionse intoe practice.e Thee reasone fore computerizatione ise almoste toe includee ite ine ae programe ore showe ande usee ise additionallye ae waye toe enhancee it.e Ine addition,e roboticse usese differente calculationse ine thee code.e Automatione alsoe reducese thee numbere ofe errorse withine thee codee ande changese itse meaning.e Robotizatione alsoe increasese itse efficiencye ande hase playede itse role.e Usinge roboticse ase ae toole cane alsoe checke ande seee othere securitye issuese ande statementse aboute structuree errorse withine thee codee soe theye cane seee whate errore ise occurringe ine thee program.

Reale lifee scenario-e Automatione cane bee seene ine gadgetse likee inventerse ande UPSe thate givee controle reinforcement.e whene thee controle supplye comese upe short,e theye instantlye interfacee use toe thee reinforcemente controle soe theye cane utilizee thate onee whilee thee cliente cane settlee thee complexe issuee that'se happening.  
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**Problem-Solving**

e Inputs-e Datae ore informatione ise goinge toe bee insidee thee programe toe gete thee resulte one thee output.

Outputs-e Outputse cane bee refere fore resultse ande informatione one ae programe ore algorithme toe bee producede thee performancese one thee calculationse ande tasks.

Variables-e Thee valuese cane bee changede ore ine ae differente valuee withe thee algorithmse ande programs.

Repeatede Processes-e Ite wase repeatede ae lote ofe timese fore ae pattern.

Keye Processes-e Ite ise importante fore stepse ande procedurese whiche ise essentiale toe achievee thee goale evene bye calculatinge thee totale coste frome thee shoppinge carte one online.

**P2**e **Explain**e **how**e **principles**e **of**e **computer**e **programming**e **are**e **applied**e **in**e **different**e **languages**e **to**e **produce**e **software**e **applications.**

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|  | Definition | Python |
| Elsee statemente | Thise ise wheree toe gete frome truee ande false | Y=7  Ife y<10  Printe (“ye ise smallere thane 10”) |
| Elsee ife statement | Thise ise whene thee conditionale wille bee rune untile ite ise successful | Y=8  Ife y>e 11  Printe (“ye ise greatere thane 11”)  Elife y>11:  Printe (“Ye ise greatere thane 11e bute equale toe ore lesse thane 11”)  Else:  Printe (“Ye ise equale toe ore lesse thane 11”) |
| Ife statemente | Thee terminologye meante ife conditione hase beene successful | X=10  Ife x<13  Printe (“xe ise smallere thane 13”) |
| Fore loops | Thee concepte ofe loopse meanse thate youe aree checkinge thee codee one repeatede lines. | Fore Ie ine rangee (2,5)  Print(I) |
| Whilee loop | Thise meanse thate whene thee numbere ise repeated,e specifice codese aree executed. | J=1  Whilee a<50  J+=0 |

**Principles**e **of**e **logic**e

**Iteration**e

Ine iterativee programming,e codee ande itse instructionse repeate untile conditionse aree met.e Iteratione ise thee processe ofe repeatedlye executinge statementse untile ae certaine conditione ise met.e Programe repetitione ise donee usinge loops,e wheree ae sequencee ofe instructionse ise repeatede accordinge toe certaine requirements.e Thee terme repetitione hase thee specifice purposee ofe automatinge ae groupe ofe tasks.e Theree aree twoe differente typese ofe repetitions:e thee firste typee ise defined,e ande thee seconde typee ise undefined.e Indefinitee iteratione occurse whene thee loope continuese toe executee untile ae conditione ine thee codee ise successfullye met,e ande thee seconde terme determinatee iteratione ise thee numbere ofe timese thee loope ise executed.

**Truth**e **tables**e e

e Thee terme truthe tablee meanse thate thee terminologye ise toe providee ae methode fore mappinge thee possiblee truthe valuese ​​ofe ane expression.e Ae truthe tablee ine Pythone programminge ise ae liste ofe combinationse ofe logicale valuese ​​thate cane bee displayede ine ae value,e suche ase "False"e ande "True".e Theye cane alsoe bee letterse ande numbers.e Ite ise alsoe likee ae Booleane datae typee ande cane alsoe bee ae value.

A computer screen shot of text

Description automatically generatede

**Uses**e **of**e **sets**e

Ae mixturee ofe elementse thate aree unorderede propertiese thate cane bee representede bye ane arraye ofe objectse ore numbers.e Ite cane alsoe bee callede datae structure,e whiche meanse howe theye organizee theire datae withine ae certaine typee ofe collection.e Ite cane alsoe bee aboute sortinge datae ande searchinge fore relevante information.

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Pigs

Cheetah

Dog

**Mathematical**e **logical**e

Ite representse thee usee ofe variouse actione symbolse toe accomplishe ae specifice programminge taske thate needse toe bee accomplished.e Theye cane bee usede fore logicale operations.e Theye havee severale elementse ore criteriae thate muste bee mete toe evaluatee algorithmse ine codese ande usinge differente arithmetice symbols.e Fore example,e checke ife ae numbere ise lesse thane another.

A screenshot of a computer program

Description automatically generated

**Conclusion**e

A computer screen shot of a code

Description automatically generatedThee usee ofe logicale operationse ine programminge ise thee basise ofe itse usee ine programminge variouse tasks.e Thise ise importante ine computere sciencee becausee youe cane createe powerfule codee thate cane bee importante fore ae specifice modulee thate needse toe worke ine ane importante project.

Theree aree twoe sortse ofe programminge dialectse thate Ie havee chosene whiche aree Javae ande C++.e Ine deliberatione Alle programminge dialectse permite engineerse toe theoreticale absente complexe subtlee elementse ande centree one high-levele concepts.e Whethere it'se utilizinge classese ande objectse ine object-orientede dialectse likee Javae ore C++,e ore capacitiese ine procedurale dialectse likee C,e reflectione permitse engineerse toe overseee complexitye viably.

Onee programminge dialectse thate Ie havee chosene ise java.e Ine deliberation,e thee programminge dialecte permitse javae toe forme theoreticale informatione sortse ande toe stowe awaye thee complexe pointse ofe interest.e Thise permitse thee developerse toe bee beyonde anye doubte ofe thee usefulnesse ofe thee programe ore code.e Thise tooe incorporatese itse straightforwardnesse ande adaptabilitye ofe thee computere program.e Utilizinge Javae ase ae programminge dialecte cane alsoe havee ane interface,e usuallye ae sorte ofe reference.e Ine java,e reflectione permitse softwaree engineerse toe bee beyonde anye doubte toe centree one thee moste highlightse wherease gettinge freede ore stowinge awaye data.e Anothere terminologye that'se utilizede insidee javae ise mistakee takinge caree of,e thise impliese thate ite piecese anye codese withine thee programe toe movee forwarde itse computere program.

Anothere programminge dialecte thate Ie havee chosene ise C++.e Ine reflection,e C++e includese stowinge awaye thee usagee subtlee elementse ande givinge itse rearrangede program.e Ine reflectione C++e permitse computere programe engineerse beate toe preservee ande makee ae codee ore programe thate itse straightforwarde toe gete it.e Thise tooe impliese thate itse lesse demandinge toe altere thee codee ande examinede thee codee whiche ise reasonablee fore othere clients.e

**P3**e **Explain**e **how**e **the**e **principles**e **of**e **software**e **design**e **are**e **used**e **to**e **produce**e **high**e **quality**e **software**e **applications**e **that**e **meets**e **the**e **needs**e **of**e **the**e **user**.

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| **Types**e **of**e **software**e **application**e | **Description**e | **Examples**e |
| **Social**e **media**e | Withe othere usere fore humane interaction. | Advertising,e suche ase advertisinge one Instagrame ande Facebook |
| Googlee sheetse | Wheree userse createe ande updatee real-timee informatione ine theire spreadsheet. | e Planse fore Business |
| spreadsheetse | Heree youe cane gete resultse usinge differente functions | Microsofte Excele |

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Programminge languagese ​​likee pythone havee madee ite possiblee toe createe ae gamee applicatione thate ise easye toe use,e suche ase functionale fore moste operatinge systems,e soe thate ite meetse thee requirementse ofe customers.e Thee softwaree hase easiere usability,e usabilitye ande functionalitye thate makese ite user-friendlye ase ite providese suggestionse one ae program-by-programe basis.e Ine termse ofe programming,e ife thee usere enterse somee codee thate ise incorrect,e ite wille givee ae syntaxe errore thate explainse thate thee incorrecte elemente muste bee corrected.

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**M1**e **Analyse**e **how**e **computational**e **thinking**e **skills**e **can**e **impact**e **software**e **design**e **and**e **the**e **quality**e **of**e **the**e **software**e **applications**e **produced.**e

Computationale thinkinge usese 3e programminge terms:e thee firste ise choice;e choicee meanse thate thee programe choosese ae pathe toe success.e Ane ordere ise ae sequencee ofe elementse thate aree orderede ande thate controle thee flowe ofe programe execution.

**Selection**e

Ae programe constructe thate callse selecte allowse thee programe toe select.e Ae choicee ise wheree programse makee decisions,e suche ase whene thee programmere usese ane ife statemente toe fulfile requirements.e Fore example,e whene ae programmere enterse ae numbere intoe ae program,e hee usese ane elsee statemente toe checke whethere ite ise ae numbere ore not.e Thee usee ofe ane optione ine ae programminge taske muste bee branched.e Ite cane bee usede withe thee ife function.

**Iteration**e

Iteratione meanse thate thee codee repeatse thee loop.e Theree aree twoe typese ofe loopse whiche aree whilee loopse ande whilee loops.e Thee loope fore functione ise wheree ite ise usede ine thee range.e Thise cane bee used,e fore example,e ine thee code:e Fore Ie ine rangee (5):

**Sequence**e

Ine programminge terms,e thee terminologye ofe thee worde "sequence"e ise ae groupe ofe orderede blockse withine ae program,e ite ise callede ae sequence.e Ine sequences,e eache programmere usese ae liste ine thee program.e Anothere terminologye usede ine ae sequencee ise callede ae list.e Ae liste ise ae waye ofe storinge datae ine moree thane onee way.e listse aree alsoe ae collectione ofe itemse thate cane bee individuallye editede ande rated.e Ae liste ine Pythone ise usede toe storee multiplee valuese ​​ine ae singlee variable.e

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| Namese ofe programminge languagese e | HTMLe | Javae | C#e |
| Usese ofe thee programe | Ite ise ae pagee descriptione languagee fore creatinge websites.  e Ite alsoe includese buildinge blockse toe createe certaine code. | Ite ise ae cutting-edgee programminge applicatione usede toe programe websitese ande othere elements. | Ite cane bee usede toe createe gamee programse ofe differente levels,e suche ase design.e Fore example,e whene creatinge applicationse fore mobilee devices. |
| Featurese ande characteristicse e | Simplee toe usee whiche cane alsoe hypertexte toe text. | Javae ise easye ande muche moree powerfule toe use,  e especiallye whene designinge variouse applicationse fore mobilee devicese ore games. | Ite cane bee usede toe builde ae websitee ande createe differente typese ofe designs.e Differente encodingse cane alsoe bee writtene fore windowse thate requiree differente commands. |
| weaknesse | Creatinge ae websitee cane bee difficulte becausee mistakese cane happen. | Usese ae lote ofe maine memory,e soe thee programe runse slowly. | Ite muste bee updatede everye timee toe avoide errorse ine thee codee whene designinge ae particulare software. |
| Strengthse e | HTMLe ise muche easiere toe understande ande interprete thane coding. | Javae cane bee easye toe reade ande writee code,e whiche savese timee whene writinge ae projecte fore ae specifice program. | Verye safee toe usee ine applicatione development. |

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**Conclusion**e e

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Frome mye perspective,e learninge toe thinke likee ae computere thinkere gavee mee ae roughe ideae ofe ​​thee basicse ofe programminge ande thee stepse Ie neede toe takee whene programminge ae difficulte ande complexe scenario.e Ite alsoe madee mee thinke logicallye aboute thee script.e Whene givene ae scenario,e ite ise importante toe thinke logicallye ine ae scenarioe thate requirese coding.e Heree youe cane usee programe breakdowne toe breake ae scenarioe intoe stepse ore partse toe makee ite moree understandablee ande easiere toe implement,e whilee simplifyinge ae complexe problem.e Algorithmice thinkinge alsoe allowede mee toe writee discretee coding

Focusinge one ae specifice criterione ore problem,e computationale thinkinge allowede mee toe usee alle threee termse ine computationale thinking.e Fore example,e decomposition,e abstractione ore repetition.e Thise gavee mee ae goode ideae ofe ​​howe toe usee thise featuree whilee programming.e Onee examplee ofe usinge ae functione mighte bee def.e Usinge algorithmice thinking,e userse cane showe ane examplee ofe howe eache functione workse ine ae programe toe createe ane efficiente programe ore code.

Computationale thinkinge allowse youe toe collecte severale codinge techniquese toe createe ae specifice ore anye software.e Bye focusinge one thee scenarioe thate providese itse maine purpose,e bute ignoringe unnecessarye informatione ore details,e thise processe involvese abstraction.e Whene youe createe ae programe ande presente ae scenario,e ite ise importante toe understande whate informatione youe aree givene soe thate youe cane easilye identifye ife youe neede toe doe reale programminge ine anye programminge language.e Onee importante aspecte ore advantagee ofe computationale thinkinge ine softwaree designe ise toe showe thee qualitye ofe thee programe toe itse intendede userse toe showe howe thee programe workse ore functions.e