

Ques2 :

Triples and Inferred triples :

```
1: [https://iiitd.ac.in/course/sweb/student/professor3,  
http://www.w3.org/1999/02/22-rdf-syntax-ns#type,  
http://www.w3.org/2000/01/rdf-schema#Resource]  
2: [https://iiitd.ac.in/course/sweb/student/memberOf,  
http://www.w3.org/2000/01/rdf-schema#subPropertyOf,  
https://iiitd.ac.in/course/sweb/student/memberOf]  
3: [https://iiitd.ac.in/course/sweb/student/student2,  
http://www.w3.org/1999/02/22-rdf-syntax-ns#type,  
http://www.w3.org/2000/01/rdf-schema#Resource]  
4: [http://www.w3.org/2000/01/rdf-schema#domain,  
http://www.w3.org/2000/01/rdf-schema#subPropertyOf,  
http://www.w3.org/2000/01/rdf-schema#domain]  
5: [http://www.w3.org/2000/01/rdf-schema#domain,  
http://www.w3.org/1999/02/22-rdf-syntax-ns#type,  
http://www.w3.org/1999/02/22-rdf-syntax-ns#Property]  
6: [https://iiitd.ac.in/course/sweb/student/course1,  
http://www.w3.org/1999/02/22-rdf-syntax-ns#type,  
http://www.w3.org/2000/01/rdf-schema#Resource]  
7: [https://iiitd.ac.in/course/sweb/student/researchgrp,  
http://www.w3.org/1999/02/22-rdf-syntax-ns#type,  
http://www.w3.org/2000/01/rdf-schema#Resource]  
8: [https://iiitd.ac.in/course/sweb/student/professor1,  
http://www.w3.org/1999/02/22-rdf-syntax-ns#type,  
http://www.w3.org/2000/01/rdf-schema#Resource]  
9: [https://iiitd.ac.in/course/sweb/student/takes,  
http://www.w3.org/2000/01/rdf-schema#subPropertyOf,  
https://iiitd.ac.in/course/sweb/student/takes]
```

10: [<https://iiitd.ac.in/course/sweb/student/Professor>,
<http://www.w3.org/2000/01/rdf-schema#subClassOf>,
<http://www.w3.org/2000/01/rdf-schema#Resource>]

11: [<https://iiitd.ac.in/course/sweb/student/advisor>,
<http://www.w3.org/2000/01/rdf-schema#subPropertyOf>,
<https://iiitd.ac.in/course/sweb/student/advisor>]

12: [<https://iiitd.ac.in/course/sweb/student/University>,
<http://www.w3.org/2000/01/rdf-schema#subClassOf>,
<http://www.w3.org/2000/01/rdf-schema#Resource>]

13: [<https://iiitd.ac.in/course/sweb/student/name>,
<http://www.w3.org/2000/01/rdf-schema#subPropertyOf>,
<https://iiitd.ac.in/course/sweb/student/name>]

14: [<https://iiitd.ac.in/course/sweb/student/name>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#Property>]

15: [<https://iiitd.ac.in/course/sweb/student/department>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/2000/01/rdf-schema#Resource>]

16: [<https://iiitd.ac.in/course/sweb/student/professor4>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/2000/01/rdf-schema#Resource>]

17: [<https://iiitd.ac.in/course/sweb/student/professor4>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<https://iiitd.ac.in/course/sweb/student/Professor>]

18: [<https://iiitd.ac.in/course/sweb/student/student3>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/2000/01/rdf-schema#Resource>]

19: [<https://iiitd.ac.in/course/sweb/student/ResearchGrp>,
<http://www.w3.org/2000/01/rdf-schema#subClassOf>,
<http://www.w3.org/2000/01/rdf-schema#Resource>]

20: [<https://iiitd.ac.in/course/sweb/student/Course>,
<http://www.w3.org/2000/01/rdf-schema#subClassOf>,
<http://www.w3.org/2000/01/rdf-schema#Resource>]

21: [<https://iiitd.ac.in/course/sweb/student/course2>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/2000/01/rdf-schema#Resource>]

22: [<https://iiitd.ac.in/course/sweb/student/subOrgOf>,
<http://www.w3.org/2000/01/rdf-schema#subPropertyOf>,
<https://iiitd.ac.in/course/sweb/student/subOrgOf>]

23: [<https://iiitd.ac.in/course/sweb/student/worksFor>,
<http://www.w3.org/2000/01/rdf-schema#subPropertyOf>,
<https://iiitd.ac.in/course/sweb/student/worksFor>]

24: [<http://www.w3.org/2000/01/rdf-schema#range>,
<http://www.w3.org/2000/01/rdf-schema#subPropertyOf>,
<http://www.w3.org/2000/01/rdf-schema#range>]

25: [<http://www.w3.org/2000/01/rdf-schema#range>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#Property>]

26: [<http://www.w3.org/2000/01/rdf-schema#subPropertyOf>,
<http://www.w3.org/2000/01/rdf-schema#subPropertyOf>,
<http://www.w3.org/2000/01/rdf-schema#subPropertyOf>]

27: [<http://www.w3.org/2000/01/rdf-schema#subPropertyOf>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#Property>]

28: [<https://iiitd.ac.in/course/sweb/student/professor2>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/2000/01/rdf-schema#Resource>]

29: [<https://iiitd.ac.in/course/sweb/student/student1>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/2000/01/rdf-schema#Resource>]

30: [xxx, <http://www.w3.org/2000/01/rdf-schema#subPropertyOf>,
zzz]

31: [<https://iiitd.ac.in/course/sweb/student/Student>,
<http://www.w3.org/2000/01/rdf-schema#subClassOf>,
<http://www.w3.org/2000/01/rdf-schema#Resource>]

32: [<https://iiitd.ac.in/course/sweb/student/Department>,
<http://www.w3.org/2000/01/rdf-schema#subClassOf>,
<http://www.w3.org/2000/01/rdf-schema#Resource>]

33: [<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/2000/01/rdf-schema#subPropertyOf>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>]

34: [<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#Property>]

35: [<https://iiitd.ac.in/course/sweb/student/student4>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/2000/01/rdf-schema#Resource>]

36: [<https://iiitd.ac.in/course/sweb/student/teaches>,
<http://www.w3.org/2000/01/rdf-schema#subPropertyOf>,
<https://iiitd.ac.in/course/sweb/student/teaches>]

37: [<http://www.w3.org/2000/01/rdf-schema#subClassOf>,
<http://www.w3.org/2000/01/rdf-schema#subPropertyOf>,
<http://www.w3.org/2000/01/rdf-schema#subClassOf>]

38: [<http://www.w3.org/2000/01/rdf-schema#subClassOf>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#Property>]

39: [<https://iiitd.ac.in/course/sweb/student/professor3>,
<https://iiitd.ac.in/course/sweb/student/teaches>,
<https://iiitd.ac.in/course/sweb/student/course2>]

40: [<https://iiitd.ac.in/course/sweb/student/professor3>,
<https://iiitd.ac.in/course/sweb/student/name>, Tim]

41: [<https://iiitd.ac.in/course/sweb/student/professor3>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<https://iiitd.ac.in/course/sweb/student/Professor>]

42: [<https://iiitd.ac.in/course/sweb/student/memberOf>,
<http://www.w3.org/2000/01/rdf-schema#range>,
<https://iiitd.ac.in/course/sweb/student/Department>]

43: [<https://iiitd.ac.in/course/sweb/student/memberOf>,
<http://www.w3.org/2000/01/rdf-schema#domain>,
<https://iiitd.ac.in/course/sweb/student/Student>]

44: [<https://iiitd.ac.in/course/sweb/student/memberOf>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#Property>]

45: [<https://iiitd.ac.in/course/sweb/student/student2>,
<https://iiitd.ac.in/course/sweb/student/takes>,
<https://iiitd.ac.in/course/sweb/student/course2>]

46: [<https://iiitd.ac.in/course/sweb/student/student2>,
<https://iiitd.ac.in/course/sweb/student/name>, John]

47: [<https://iiitd.ac.in/course/sweb/student/student2>,
<https://iiitd.ac.in/course/sweb/student/advisor>,
<https://iiitd.ac.in/course/sweb/student/professor1>]

48: [<https://iiitd.ac.in/course/sweb/student/student2>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<https://iiitd.ac.in/course/sweb/student/Student>]

49: [<https://iiitd.ac.in/course/sweb/student/course1>,
<https://iiitd.ac.in/course/sweb/student/name>, Databases]

50: [<https://iiitd.ac.in/course/sweb/student/course1>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<https://iiitd.ac.in/course/sweb/student/Course>]

51: [<https://iiitd.ac.in/course/sweb/student/researchgrp>,
<https://iiitd.ac.in/course/sweb/student/name>, InfoLab]

52: [<https://iiitd.ac.in/course/sweb/student/researchgrp>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<https://iiitd.ac.in/course/sweb/student/ResearchGrp>]

53: [<https://iiitd.ac.in/course/sweb/student/professor1>,
<https://iiitd.ac.in/course/sweb/student/worksFor>,
<https://iiitd.ac.in/course/sweb/student/department>]

54: [<https://iiitd.ac.in/course/sweb/student/professor1>,
<https://iiitd.ac.in/course/sweb/student/teaches>,
<https://iiitd.ac.in/course/sweb/student/course2>]

55: [<https://iiitd.ac.in/course/sweb/student/professor1>,
<https://iiitd.ac.in/course/sweb/student/name>, Fred]

56: [<https://iiitd.ac.in/course/sweb/student/professor1>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<https://iiitd.ac.in/course/sweb/student/Professor>]

57: [<https://iiitd.ac.in/course/sweb/student/takes>,
<http://www.w3.org/2000/01/rdf-schema#range>,
<https://iiitd.ac.in/course/sweb/student/Course>]

58: [<https://iiitd.ac.in/course/sweb/student/takes>,
<http://www.w3.org/2000/01/rdf-schema#domain>,
<https://iiitd.ac.in/course/sweb/student/Student>]

59: [<https://iiitd.ac.in/course/sweb/student/takes>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#Property>]

60: [<https://iiitd.ac.in/course/sweb/student/advisor>,
<http://www.w3.org/2000/01/rdf-schema#range>,
<https://iiitd.ac.in/course/sweb/student/Professor>]

61: [<https://iiitd.ac.in/course/sweb/student/advisor>,
<http://www.w3.org/2000/01/rdf-schema#domain>,
<https://iiitd.ac.in/course/sweb/student/Student>]

62: [<https://iiitd.ac.in/course/sweb/student/advisor>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#Property>]

63: [<https://iiitd.ac.in/course/sweb/student/Professor>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/2000/01/rdf-schema#Class>]

64: [<https://iiitd.ac.in/course/sweb/student/University>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/2000/01/rdf-schema#Class>]

65: [<https://iiitd.ac.in/course/sweb/student/department1>,
<https://iiitd.ac.in/course/sweb/student/name>, CS]

66: [<https://iiitd.ac.in/course/sweb/student/department>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<https://iiitd.ac.in/course/sweb/student/Department>]

67: [<https://iiitd.ac.in/course/sweb/student/professor4>,
<https://iiitd.ac.in/course/sweb/student/name>, Lisa]

68: [<https://iiitd.ac.in/course/sweb/student/student3>,
<https://iiitd.ac.in/course/sweb/student/takes>,
<https://iiitd.ac.in/course/sweb/student/course1>]

69: [<https://iiitd.ac.in/course/sweb/student/student3>,
<https://iiitd.ac.in/course/sweb/student/name>, Lee]

70: [<https://iiitd.ac.in/course/sweb/student/student3>,
<https://iiitd.ac.in/course/sweb/student/advisor>,
<https://iiitd.ac.in/course/sweb/student/professor2>]

71: [<https://iiitd.ac.in/course/sweb/student/student3>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<https://iiitd.ac.in/course/sweb/student/Student>]

72: [<https://iiitd.ac.in/course/sweb/student/ResearchGrp>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/2000/01/rdf-schema#Class>]

73: [<https://iiitd.ac.in/course/sweb/student/Course>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/2000/01/rdf-schema#Class>]

74: [<https://iiitd.ac.in/course/sweb/student/course2>,
<https://iiitd.ac.in/course/sweb/student/name>, Algorithms]

75: [<https://iiitd.ac.in/course/sweb/student/course2>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<https://iiitd.ac.in/course/sweb/student/Course>]

76: [<https://iiitd.ac.in/course/sweb/student/subOrgOf>,
<http://www.w3.org/2000/01/rdf-schema#range>,
<https://iiitd.ac.in/course/sweb/student/ResearchGrp>]

77: [<https://iiitd.ac.in/course/sweb/student/subOrgOf>,
<http://www.w3.org/2000/01/rdf-schema#domain>,
<https://iiitd.ac.in/course/sweb/student/Department>]

78: [<https://iiitd.ac.in/course/sweb/student/subOrgOf>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#Property>]

79: [<https://iiitd.ac.in/course/sweb/student/worksFor>,
<http://www.w3.org/2000/01/rdf-schema#range>,
<https://iiitd.ac.in/course/sweb/student/Department>]

80: [<https://iiitd.ac.in/course/sweb/student/worksFor>,
<http://www.w3.org/2000/01/rdf-schema#domain>,
<https://iiitd.ac.in/course/sweb/student/Professor>]

81: [<https://iiitd.ac.in/course/sweb/student/worksFor>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#Property>]

82: [<https://iiitd.ac.in/course/sweb/student/professor2>,
<https://iiitd.ac.in/course/sweb/student/worksFor>,
<https://iiitd.ac.in/course/sweb/student/department>]
83: [<https://iiitd.ac.in/course/sweb/student/professor2>,
<https://iiitd.ac.in/course/sweb/student/teaches>,
<https://iiitd.ac.in/course/sweb/student/course1>]
84: [<https://iiitd.ac.in/course/sweb/student/professor2>,
<https://iiitd.ac.in/course/sweb/student/name>, James]
85: [<https://iiitd.ac.in/course/sweb/student/professor2>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<https://iiitd.ac.in/course/sweb/student/Professor>]
86: [<https://iiitd.ac.in/course/sweb/student/student1>,
<https://iiitd.ac.in/course/sweb/student/takes>,
<https://iiitd.ac.in/course/sweb/student/course2>]
87: [<https://iiitd.ac.in/course/sweb/student/student1>,
<https://iiitd.ac.in/course/sweb/student/name>, Ben]
88: [<https://iiitd.ac.in/course/sweb/student/student1>,
<https://iiitd.ac.in/course/sweb/student/advisor>,
<https://iiitd.ac.in/course/sweb/student/professor4>]
89: [<https://iiitd.ac.in/course/sweb/student/student1>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<https://iiitd.ac.in/course/sweb/student/Student>]
90: [<https://iiitd.ac.in/course/sweb/student/Student>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/2000/01/rdf-schema#Class>]
91: [<https://iiitd.ac.in/course/sweb/student/Department>,
<http://www.w3.org/1999/02/22-rdf-syntax-ns#type>,
<http://www.w3.org/2000/01/rdf-schema#Class>]

92: [https://iiitd.ac.in/course/sweb/student/student4,
https://iiitd.ac.in/course/sweb/student/takes,
https://iiitd.ac.in/course/sweb/student/course1]
93: [https://iiitd.ac.in/course/sweb/student/student4,
https://iiitd.ac.in/course/sweb/student/name, Peter]
94: [https://iiitd.ac.in/course/sweb/student/student4,
https://iiitd.ac.in/course/sweb/student/advisor,
https://iiitd.ac.in/course/sweb/student/professor2]
95: [https://iiitd.ac.in/course/sweb/student/student4,
http://www.w3.org/1999/02/22-rdf-syntax-ns#type,
https://iiitd.ac.in/course/sweb/student/Student]
96: [https://iiitd.ac.in/course/sweb/student/teaches,
http://www.w3.org/2000/01/rdf-schema#range,
https://iiitd.ac.in/course/sweb/student/Course]
97: [https://iiitd.ac.in/course/sweb/student/teaches,
http://www.w3.org/2000/01/rdf-schema#domain,
https://iiitd.ac.in/course/sweb/student/Professor]
98: [https://iiitd.ac.in/course/sweb/student/teaches,
http://www.w3.org/1999/02/22-rdf-syntax-ns#type,
http://www.w3.org/1999/02/22-rdf-syntax-ns#Property]

Ques3 :

Reification By Named graph (technique 1):

```
//Here's is the model for reification task  
String ng = "http://example.org/reification"; //ng->  
named_graph  
Model reifiedModel = ModelFactory.createDefaultModel();
```

```

reifiedModel.setNsPrefix("reification", ng);
//traverse over all triples of the .ttl file
StmtIterator itr = model.listStatements(); //iterator
while (itr.hasNext()) {
    Statement stmt = itr.nextStatement(); //statement
    Resource subj = stmt.getSubject(); //subject
    Property pred = stmt.getPredicate(); //predicate
    RDFNode obj = stmt.getObject(); //object
    //Create blank node for reification
    Resource blankNode = reifiedModel.createResource();
    // Adding reified statements
    reifiedModel.add(blankNode, RDF.type, RDF.Statement);
    reifiedModel.add(blankNode, RDF.subject, subj);
    reifiedModel.add(blankNode, RDF.predicate, pred);
    reifiedModel.add(blankNode, RDF.object, obj);

    Resource namedSubj =
reifiedModel.createResource(subj.getURI());
    namedSubj.addProperty(reifiedModel.createProperty(ng,
"statement"), blankNode);
}

```

Reification By Singleton Property (technique 2):

```

//Creating a model for reification
String singleton = "http://example.org/reification";
Model reified_Model = ModelFactory.createDefaultModel();
reified_Model.setNsPrefix("reification", singleton);
//instantiate the object of singleton property

```

```

    Property sp = reified_Model.createProperty(singleton,
"hasStatement");
    //traversing over all triples
    StmtIterator iter = model.listStatements();
    while (iter.hasNext()) {
        Statement stmt = iter.nextStatement();
        Resource subj = stmt.getSubject(); //subject
        Property pred = stmt.getPredicate(); //predicate
        RDFNode obj = stmt.getObject(); //object
        //Adding reified statements
        Resource reified_Stmt = reified_Model.createResource()
            .addProperty(RDF.type, RDF.Statement)
            .addProperty(RDF.subject, subj)
            .addProperty(RDF.predicate, pred)
            .addProperty(RDF.object, obj);

        Resource namedSubj =
reified_Model.createResource(subj.getURI());
        namedSubj.addProperty(sp, reified_Stmt);
    }

```