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## **Chapter-10: Complexity and classification of problems**

### Solutions for Review Questions

**Q.1** Write a short note on P-type and NP-type problems.

**Solution:**

Refer to the section 10.3.3.1.

**Q.2** Define the following terms:

- (i) NP-complete problem
- (ii) Intractable problem

**Solution:**

(i) NP-complete problem: Refer to the section 10.3.3.2.

(ii) Intractable problem: NP-type problems are known as *intractable* problems. Refer to the section 10.3.3.1.

**Q.3** What is a non-deterministic algorithm? Explain with the help of an example.

**Solution:**

Refer to the section 10.3.1.

**Q.4** Explain Cook's theorem.

**Solution:**

Refer to the section 10.3.3.3.

**Q.5** What is a satisfiability problem?

**Solution:**

Refer to the section 10.3.2.2.

**Q.6** Write a short note on time complexity and different complexity notations.

**Solution:**

Refer to the section 10.2.

**Q.7** How is the time and space complexity of a TM measured?

**Solution:**

Refer to the section 10.2.2.

**Q.8** What are conjunctive normal form and disjunctive normal form?

**Solution:**

Refer to the section 10.3.2.1.

**Q.9** Explain the terms: valid / invalid formula and satisfiable / unsatisfiable formula.

**Solution:**

Refer to the section 10.3.2.2.

**Q.10** What is Ackermann's function? Comment on the time complexity of the Ackermann's function.

**Solution:**

Refer to the section 10.2.1.1.

**Q.11** Explain NP-hard and NP-complete problems with the help of suitable examples.

**Solution:**

Refer to the section 10.3.3.2.