GYAN GANGA INSTITUTE OF TECHNOLOGY AND SCIENCES, JABALPUR

B.TECH IIIRD SEMESTER (BRANCH : CS, IT, IOT)

UNIT – III

DISCRETE STRUCTURE

**ASSIGNMENT QUESTIONS**

Q.1 Prove that the following statement is logically equivalent:

Q. 2 Let P: Raju is rich and let Q: Raju is happy .

Write each of the following in symbolic from

(i) Raju is poor but happy.

(ii) Raju is neither rich nor happy.

(iii) Raju is rich and unhappy.

Q. 3 Let P(x): x is student.

Q(x): x is cleaver

R (x): x is successful.

Express the following using quantifiers.

(a) There exists a student

(b) Some student are cleaver

(c) Some students are not successful.

Q. 4 Define Finite State Automata .

Q.5 Write truth table of the statement

[(p→q)∧ (q→r)]⇔ (p→r)

Q.6 Obtain the conjunctive normal form of

Q.7 What do you understand by Universal & Existential quantifiers? Explain with example.

Q.8Obtain disjunctive normal form of .

Q.9 (i) Construct a finite state acceptor that will accept the set of Natural numbers x which are divisible by 3.

(ii) Design a finite state machine M that can add two binary numbers.

Q10. Test the validity of the argument:

If two sides of a triangle are equal, then the opposite angles are equal.

Two sides of a triangle are not equal.

Therefore the opposite angles are not equal

Q11. Define Finite state automata and Show that the following two machines are equivalent:

**MACHINE 1:**

|  |  |  |  |
| --- | --- | --- | --- |
| State | Input | | Output |
| 1 2 | |
| A | B | C | 0 |
| B | F | D | 0 |
| C | G | E | 0 |
| D | H | B | 0 |
| E | B | F | 1 |
| F | D | H | 0 |
| G | E | B | 0 |
| H | B | C | 1 |

**MACHINE 2:**

|  |  |  |  |
| --- | --- | --- | --- |
| State | Input | | Output |
| 1 2 | |
| A | B | C | 0 |
| B | C | D | 0 |
| C | D | E | 0 |
| D | E | B | 0 |
| E | B | C | 1 |

Q.12 For the finite state machine shown below, find all equivalent states and obtain an equivalent finite states machine with the smallest number of states;

|  |  |  |  |
| --- | --- | --- | --- |
| States | Input | | Output |
| 0 | 1 |
| A  B  C  D  E  F  G  H | F  D  G  E  D  A  C  A | B  C  B  A  A  G  H  H | 0  0  0  1  0  1  1  1 |

Q.13 Show that the language L = { akbk : k ≥ 1 } is not a finite state language.

Q.14 Show that the language L ={aP: p is prime } is not a finite state machine.