1. “A key property of deductive systems is that they are purely syntactic, so that derivations can be verified without considering any interpretation. Thus a sound argument is correct in every possible interpretation of the language, regardless whether that interpretation is about mathematics, economics or some other area”. Represent the above sentences in FOPL and explain each step.
2. “The department of Electronics and Computer Engineering offers two undergraduate degrees, Computer Engineering and Electronics and Communication Engineering. Almost 75% of those courses are similar. If the students of any of those engineering program study another one year more can be eligible to get both degrees. Only some of them may be interested to get Bachelor in Computer, Electronics and Communication Engineering”. Represent the above sentences in FOPL and explain each step.
3. “A deductive system is sound if any formula that can be derived in the system is logically valid. Conversely, a deductive system is complete if every logically valid formula is derivable. All of the systems discussed in this article are both sound and complete. They also share the property that it is possible to effectively verify that a purportedly valid deduction is actually a deduction, such deduction systems are called effective”. Represent the above sentences in FOPL and explain each step.
4. “All married employees earning Rs 140,000 or more per year in Nepal pay taxes. All unmarried employees earning Rs 115,000 or more per year in Nepal pay taxes. The president of Nepal earns Rs 2,500,000 and has to pay maximum taxes. No other employees earn more than the president. Some of Nepalese citizens earn less than Rs 100 per day and they don’t have to pay any taxes”. Represent the above sentences in FOPL and explain each step.
5. “A person born in Nepal, and whose parents are a Nepali citizen by birth, is a Nepali citizen by birth. A person born outside Nepal, and one of whose parents is a Nepali citizen by birth, is a Nepali citizen by descent. Several developed countries have dual citizenship provision, but Nepali doesn’t have that provision”. Represent the above sentences in FOPL and explain each step.
6. Justify that MYCIN is a probabilistic reasoning with derivations and example.
7. Translate each of the following into logical notation of predicate with quantifiers.
   1. Some diamonds are used for adornment.
   2. Only things worn as jewels or applied as cosmetics are used for adornments.
   3. Diamonds are never applied as cosmetics.
   4. Nothing worn as jewel is properly used if it has an industrial application.
   5. Some diamonds have industrial application.

Can you prove that there are some diamonds that are not properly used?

1. “Hierarchical organization is one of the major advancement techniques in knowledge engineering.” Do you agree on the statement? If yes justify otherwise why?
2. Translate each of the following into logical notation of predicate with quantifiers and convert them into CNF.
   1. No coat is waterproof, unless it has been specially treated.
   2. Everyone is special to someone at least.
   3. It is not true that every watch will keep good time if and only if it is wound regularly and not abused.
   4. Not every person who talks a great deal has a great deal to say.
3. Given the following premises.

Bhogendra likes all kinds of food. Oranges are food. Chicken is food. Anything anyone eats and isn’t killed by is food. If a person likes a food means that person has eaten it. Bhogendra eats peanuts and is still alive. Shailendra eats everything Bhogendra eats.

Express them in FOPL, put them into clausal form and use resolution to prove that Shailendra likes chickens.

1. Present an example of robot soccer players as an intelligent problem solving agent, with well defined problem, solution and state space details.
2. “Though Turing Test is not reproducible, it sent sparks flying and a whole AI field what is today is the result of that spark of 50 years ago.” Do you agree on the statement? If yes justify otherwise why?
3. What is knowledge engineering? How it differs from conventional programming?
4. Given the following premises
   1. All employees’ earnings Rs 60,000 or more per year pay taxes.
   2. Some employee is sick today.
   3. No employee earns more than the president.
   4. Amy employee can become president.
   5. President, manages all of the employees, is also an employee.

Express a,b,c in PL, d,e in FOPL, and put them all in clausal form.

1. What are the issues in knowledge representation?