1. (10%) Discuss the challenges faced in hospital information system development. Propose a possible approach to overcoming such challenges.
2. (10%) What are the functional components of an electronic health record system?
3. (10%) What is so called “High Throughput technology”? Microarray is one of these high throughput technologies. Describe the details about the microarray technology?
4. (10%) State three successful applications in medical imaging using CAD (computer aided diagnosis.)
5. (10%) What are the advantages of rule-based and corpus-based approaches in natural language processing?
6. (10%) What is patient monitoring? Please list five categories of patients who need physiological monitoring.
7. (15%) Medical information retrieval by natural language queries is helpful for both healthcare consumers and professionals. The system receives a short natural language text as input, and tries to retrieve very relevant information in response to the text. In practice, the short text may be extracted from a medical literature, order for a patient, diagnosis report, and healthcare news. When requiring more information relevant to the text, the users do not need to construct and test various kinds of Boolean queries. Answer the following questions:
   a. Main steps of a medical information retrieval system that accepts natural language queries, and
   b. Challenges of developing the system.
8. (10%) What are the possible medical practices incorporated with medical informatics in the future?
9. (15%) A drug company is developing a new pregnancy-test kit for use on an outpatient basis. The company uses the pregnancy test on 100 women who are known to be pregnant, of whom 95 are positive using the test. The company uses the pregnancy test on 100 other women who are known to not be pregnant, of whom 99 are negative using the test.
   a. What are the sensitivity and specificity of the test?
   b. The company anticipates that of the women who will use the pregnancy-test kit, 10% will actually be pregnant. Calculate the probability that an individual is pregnant given that she tests positive? What is the predictive value of a negative test?