※ 考生請注意：本試題不可使用計算機。　請於答案卷(卡)作答，於本試題紙上作答者，不予計分。

1. (20 %) Data conversion

(a) Convert decimal $(30.25)_{10}$ into the binary format.

(b) Convert hexadecimal $(F3A)_{16}$ into the decimal, binary and octal formats.

(c) Convert decimal $(-7.1875)_{10}$ into the IEEE-32 floating-point standards with 1-bit sign, 8-bit exponent of bias 127, 23-bit mantissa.

2. (20 %) Describe the layers of TCP/IP protocol and match the following to one or more layers of the TCP/IP protocol:

(a) route determination

(b) responsibility for handling frames between adjacent nodes

(c) transforming bits to the electromagnetic wave

3. (20 %) Please give the major features of object-oriented programming language (OOP) and briefly describe each feature by an example.

4. (20 %) Using the Unified Modeling Language (UML) diagram (or flowchart) for program to convert the decimal to binary using modular function and stack data structure with push and pop functions. Also, please give pseudocode or any programming language.

5. (20 %) The following figure is an acquired ECG waveform (signal from heart beats). Assume that the sampling rate is 200 Hz, i.e. 200 ECG data points per second.

(a) Please write a segment of program using your familiar computer language or pseudo code to detect peak-to-peak amplitude (between two x's in the figure) and peak-to-peak interval (t) .

(b) Convert the peak-to-peak interval to hear rate in terms of beats per minute (BPM). Draw a flowchart to express your algorithm and assumptions in (a)-(b).