UNIVERSITI KUALA LUMPUR
MALAYSIAN INSTITUTE OF INDUSTRIAL TECHNOLOGY

FINAL EXAMINATION

JANUARY 2016 SEMESTER

COURSE CODE	:	JCB 30404
COURSE TITLE	:	PIPING ENGINEERING MECHANISM AND CONTROL
PROGRAMME LEVEL	:	BACHELOR
DATE	:	22 MAY 2016
TIME	:	2.30 PM – 05.30 PM
DURATION	:	3 HOURS

INSTRUCTIONS TO CANDIDATES

1. Please read the instructions given in the question paper CAREFULLY.
2. This question paper is printed on both sides of the paper.
3. This question paper consists of TWO (2) sections.
4. Answer ALL questions in Section A. Choose THREE (3) questions in section B.
5. Please write your answers on the answer booklet provided.
6. Please answer all questions in English only.

THERE ARE 3 PAGES OF QUESTIONS EXCLUDING THIS PAGE.

SECTION A (Total: 40 marks)

INSTRUCTION: Answer ALL questions.
Please use the answer sheet provided.

Question 1

As a pipe engineer, you have to be familiar with pipe drawing, fitting, material and installation.

(a) Draw (3D) the distribution of chemical (liquid) from main tank to other 4 tanks. Assume the size of pipe at Tank 3 and Tank 4 are smaller than other pipe tank. Label all pipe fitting and control.

(10 marks)

(b) Illustrate the general information for the following pipe materials :-

i) Galvanized steel pipe (GI)
ii) High density polyethylene (HDPE)
iii) Polyvinyl chloride (PVC)
iv) Copper tubing
v) Electro-galvanization

(10 marks)

Question 2

Maintenance of piping systems is very important and essential to prevent or mitigate credible accident that would have unacceptable consequences to the workers, the public or the environment.

(a) Demonstrate the **TWO (2)** maintenance strategies of piping systems.

(10 marks)

(b) Based on your experience in Polyvinyl chloride (PVC) Lab, demonstrate the suitable method for pipe installation and inspection activities.

(10 marks)

SECTION B (Total: 60 marks)

INSTRUCTION: Choose THREE (3) questions only
Please use the answer booklet provided

Question 1

Plumbing fitting have different shapes which allow rigid straight pipe to change both direction and diameter. In addition, valve are used to control the flow of water or other fluids in a plumbing system.

(a) Explain and sketch the symbol and function of below valve :

i) Safety valve
ii) Globe valve
iii) Gate valve (Normally Closed)
iv) Safety valve
v) Check valve

(10 marks)

(b) Sketch the shape (diagram) and explain the function of below pipe fitting :

i) Reducer
ii) Union
iii) Coupling
iv) Street elbow
v) Tee

(10 marks)

Question 2

The velocity of flow in a water pipeline depends on the pipe size and flow rate.

(a) Water flow through NPS 20 pipeline (0.375 –in wall thickness) at the rate of 8000 Gal/min. Determine the average velocity and analyze the Reynolds number of flow. Assume water has a viscosity of 1.0 cSt.

(10 marks)

(b) Determine the pressure in psi at a water depth of 200 ft assuming the specific weight of water is 62.4 lb/ft3. If the atmospheric pressure is 14.7 psi, analyze the absolute pressure in psi at that location.

(10 marks)

Question 3

The question below is referring to the stress analysis for water system piping.

(a) Determine the internal design pressure and required hydro test pressure for an NPS 20 water pipeline (0.375-in wall thickness) if is constructed of steel (seam joint factor 1.0) with a yield strength of 52,000 psi. Assume the pipe design factor of 0.66.

(10 marks)

The question below is referring to the stress analysis for gas system piping.

(b) Determine the allowable internal design pressure for a 16-inch (0.250-in wall thickness) pipeline constructed of API 5LX-52 steel (has a yield strength of 52000 psi). Evaluate the wall thickness will be required if an internal working pressure of 1500 psi is required. Given design factor F=0.72 and for operating temperature below 200 Degree F.

(10 marks)

Question 4

A hydrostatic test is away in which pressure vessel such as pipeline, plumbing, gas cylinders, boilers and fuel tanks can be tested for strength and leaks.

(a) Describe the hydrostatic testing procedure based on the practice of American Society of Mechanical Engineers (ASME) code.

(10 marks)

(b) List down **THREE (3)** characteristics of water that is used for hydrostatic testing based on the practice of American Society of Mechanical Engineers (ASME) code.

(10 marks)

END OF EXAMINATION PAPER