POST GRADUATE DIPLOMA IN FIRE SAFETY AND DISASTER MANAGEMENT (PGDFSTYDM)

Term-End Examination 00805

December, 2011

MSE-007 : FIRE ENGINEERING SCIENCE

Time : 3 hours *Maximum Marks : 100*

Note : *1. Q. No. 1 is **compulsory.***
*2. Attempt **any four** questions from remaining.*
3. Log Tables non- Programmable calculators can be used.

1. (a) Tick the correct answer. **2x10=20**

(i) How much heat is required to convert 10 gms. of ice at $-10°C$ into steam.
(A) 726 Cal.
(B) 1726 Cal.
(C) 2726 Cal.
(D) 7260 Cal.

(ii) What term will satisfy to the minimum Temperature at which sufficient vapors are given by a flammable material to ignite on application of external flame ?
(A) Flash Point
(B) Ignition Temp.
(C) Auto Ignition Temp.
(D) Spontaneous Ignition Temp.

(iii) If the nozzle diameter is doubled, what will be change in Jet reaction while discharging water ?

(A) one-fourth

(B) Halved

(C) doubled

(D) 4-times

(iv) At what pressure a nozzle of 40 m.m will discharge 2133 LPM ?

(A) 2 bars (B) 3 bars

(C) 4 bars (D) 9 bars

(v) While taking water from open source, higher vacuum reading is observed. State the reason.

(A) Falling level of static water

(B) Increase in discharge rate

(C) Partial blockage of strainer

(D) All three.

(vi) What is the reason that solids in dust form are more susceptible to fire and explosion ?

(A) Because of Increased mass

(B) because of reduction in Ignition Temp.

(C) because of larger surface area exposed to air

(D) None of the above.

(vii) From among the following gases, which gas is considered most dangerous with respect to its flammability.

(A) Hydrogen (B) Acetylene

(C) Butane (D) Propane

(viii) A delivery hose is taken to certain height from pump level as a result pressure at pump increases by 2.5 bars. If the total loss due to friction is . 5 bars, what is the height of nozzle ?

(A) 15 meters

(B) 20 meters

(C) 25 meters

(D) 30 meters

(ix) Why practical pump lift is less than theoretical life ?

(A) due entry loss

(B) due bend loss

(C) due friction loss

(D) all three.

(x) Diameter of a nozzle was doubled and it was found that the discharge rate is 3200 LPM at 9-bar pressure. What was it original discharge rate ?

(A) 6400 LPM

(B) 1600 LPM

(C) 800 LPM

(D) 1500 LPM

(b) Fill in the blanks : **2x10=20**

(i) Carboxi haemoglobin will be formed in blood if _____ gas is inhaled.

(ii) The temperature above which a gas can not be liquified by pressure alone, is known as _____.

(iii) Among all pumps, _____ pump is least efficient.

(iv) Heat required to raise the temperature of unit of substance by 1°C is known as_____

(v) In an ideal gas variation in its temperature is _____ proportional to its volume, if pressure remain constant

(vi) If a stone is through upward at a speed of 70 km/H the speed of the stone while reaching back to the ground will be _____km/H

(vii) A temperature of 100°C is equal to _____°F.

(viii) Wattage of bulb at 240 volt supply with consumption of 15 Amp. current would be _____ W.

(ix) The force required for movement of electrons is known as _____

(x) Maximum Theoretical suction lift is _____ meters.

2. A pump is delivering water through a 70 mm. hose, 150 meters long with 25 mm nozzle at a pressure of 4 bars. The friction factor of Hose is .005.

(a) Calculate the loss of pressure due to friction. 8

(b) What pressure is maintained in pump to maintain 4 bar pressure at nozzle, if 5 bar additional bend loss is anticipated ? 7

3. (a) Define spontaneous Ignition Temp. 5

(b) State the conditions which are necessary for spontaneous combustion to take place. 5

(c) In the light of definition given above, explain why carbon-di-sulphide Linseed oil and haystack are special risk. 5

4. (a) Write the chemical equations of following : 8

(i) Magnesium burning in oxygen to form magnesium oxide

(ii) Iron reacting with Hydrochloric Acid to give ferrous chloride

(iii) Methane burning in oxygen to give CO_2 and H_2O.

(iv) Carbon heated in steam to give CO and H_2

(b) Find Vapor densities of CO_2, CO, O_2 and CH_4. Atomic wt. of C = 12; O = 16; H = 1, Cl_2 = 35.5 7

5. What is Tetra-Hedron of fire ? Give details of principles of fire extinction and name the best extinguishing media fulfilling each principle. 15

6. (a) Explain Gas Laws with examples. 8

(b) A cylinder with 5 Litres capacity is filled at 5 bar pressure at 27°C. After a fire the temperature of cylinder went up to 327°C. Find the pressure of cylinder. 7

7. Give short notes on ***any three*** of the following : 3x5=15

(a) Physical properties of water

(b) Diffusion of gases

(c) Thermal Expansion

(d) Venture effect

(e) Work, Energy and power

(f) Critical Temperature and pressure.

8. (a) A hose line is Laid down the hill, 60 meter high, having 30° angle of depression. Find the length of hose if the slope is gradual and the pressure at base if the pump pressure is 1-bar. 8

(b) What is Bernoulli's Theorem ? Give three examples of application of Bernoulli's Theorem. 7