TERTIARY AND VOCATIONAL EDUCATION COMMISSION

Fluid Power Technology
NVQ Level 5 Semester l Examination

Fluid Mechanics – E40C00M06

Instructions to Candidates:

1. **Answer five (05) questions**

Total Time: 03 hours **Total Marks: 100**

Question (1)

(a) State Bernoulli's theorem. (04 Marks)

(b) Define

(i) Flow rate

(ii) Flow velocity (04 Marks)

(c) Distinguish between **Laminar** flow and **Turbulent** flow. (04 Marks)

(d) A petrol storage tank is **5m** long, **4m** wide and **4m** deep. It contains petrol of relative Density **0.72** to a depth of **3m**. Calculate.

(i) The pressure on the base of the tank, in (**kN /m^2**)

(ii) The total force on the base of the tank, in (**kN**) (08 Marks)

Question (2)

(a)Describe the Pascal's law with suitable practical application. (04 Marks)

(b)A vehicle is to be lifted by a hydraulic jack as shown in figure **(2)** below. Mass of the vehicle is **1500 Kg**. Find the amount of force (**F_1)** required at the pedal to lift the vehicle? (08 Marks)

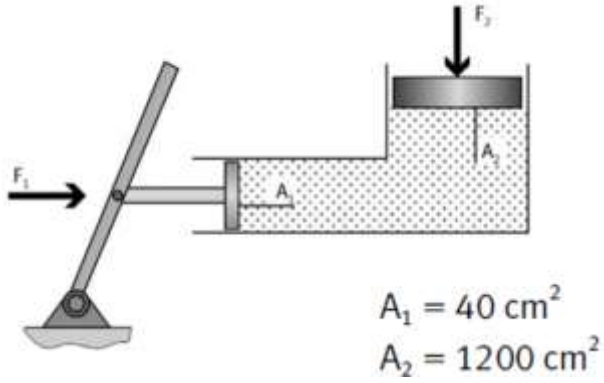

Figure **(2)**

(c) A heavy car immersed into a lake during an accident and lands at the bottom of the lake on its wheels [Figure(3) shown in below].The door is 1.2m high and 1m wide, and the top edge of the door is 8 m below the free surface of the water. Determine the Hydrostatic force on the door and the centre of pressure [**Take $I_G = bd^3/12$**].

(08 Marks)

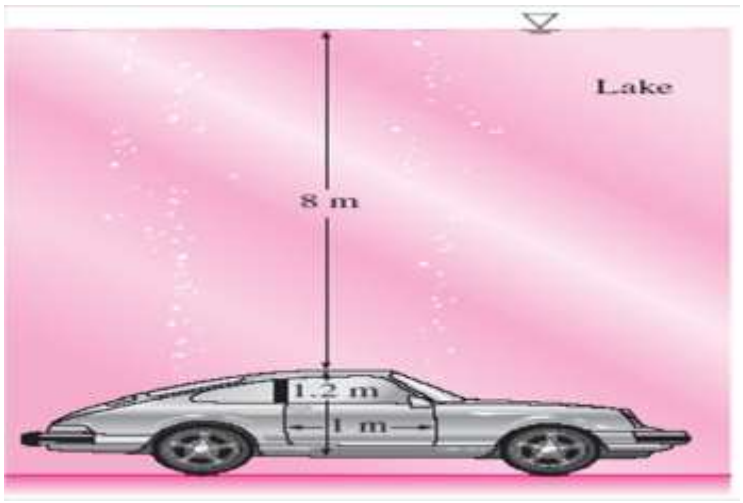

Figure **(3)**

Question (3)

(a)What are the classes of manometer? (04 Marks)

(b)Explain the functions of a manometer. (04 Marks)

(c)As shown in figure **(1)** below, pipe **A** contains carbon tetrachloride of specific gravity **1.594** under a pressure of **103 KN/m^2** and pipe **B** contains oil of specific gravity **0.8** .If the pressure in the pipe B is **171.6 KN/m^2** and manometric fluid is mercury, Find the difference **h** between the levels of mercury. (12Marks)

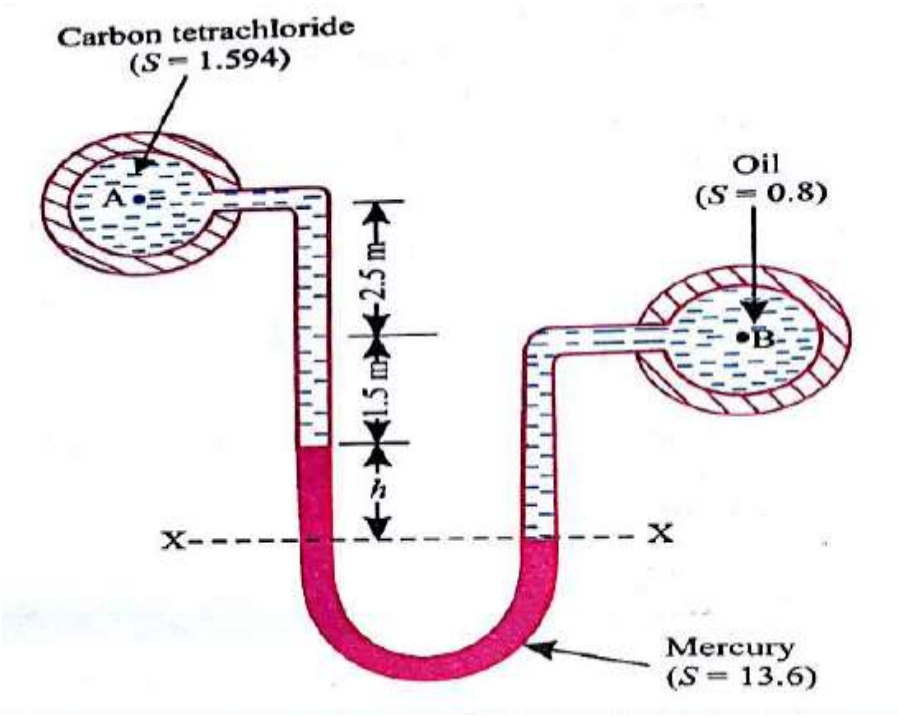

Figure **(1)**

Question (4)

(a) Define the following terms,

(i) Density

(ii) Specific Weight

(iii) Specific Gravity

(iv) Capillarity of Water

(08 Marks)

(b) In an experiment, the weight of 2.5 m^3 of a certain liquid was found to be 18.75 **kN**. Find the specific weight of the liquid. Also find its density. (04 Marks)

(c) Calculate the Specific weight, specific gravity of a liquid having a volume of **6 m^3** and weight of 44 **kN**. (04 Marks)

(d)The pressure intensity at a point in a fluid is given 3.924 N / Cm^2. Find the corresponding height of fluid when the fluid is;

(i) Water,

(ii) Oil of specific gravity 0.9. (04 Marks)

Question (5)

(a) Define the following terms

(i) Atmospheric pressure

(ii) Gauge pressure

(iii) Absolute pressure

(06 Marks)

(b) A steel plate is immersed in an oil of specific weight 7.5 KN/m^3 up to a depth of 2.5 m .what is the intensity of pressure on the plate due to the oil? (04 Marks)

(c) On the suction side of a pump a gauge shows a negative pressure of 0.35 bar. Express this pressure in terms of :

(i) Intensity of pressure, kPa,

(ii) N/m^2 absolute pressure

(iii) Metres of water gauge

(iv) Metres of oil (Specific gravity 0.82) absolute ,and

(v) Centimetres of mercury gauge,

(Take atmospheric pressure as 76 cm of Hg and relative density of mercury as 13.6)

(10 Marks)