Uva Wellassa University, Sri Lanka
End Semester Examination – January 2010
SCT 262-2 Engineering Physics

Time: Two (02) hours

Total 06 questions
Answer **Five (05)** questions only
Clearly state any assumptions made
You can assume any missing data
Tables of properties are provided in the exam hall

01) I. Define the following processes:
   a) Isothermal process
   b) Isobaric process
   c) Isochoric process
   d) Adiabatic process

(8 marks)

II. A rigid tank with a volume of 2.5 m^3 contains 15 kg of saturated liquid – vapor mixture of water at 75^{0}C. Now the water is slowly heated. Determine the temperature at which the liquid in the tank is completely vaporized. Also, show the process on a T-v diagram with respect to saturation lines.

(12 marks)

02) A frictionless piston-cylinder device contains 2 kg of nitrogen at 100 kPa and 300 K. Nitrogen is now compressed slowly according to the relation $Pv^{1.4}$ = constant until it reaches a final temperature of 360 K. Calculate the work input during the process.

(20 marks)

03) I. List out the three common type of manometers with advantages and disadvantages of them.

(10 marks)

II. A large, open tank contains water and is connected to a 2 m diameter conduit as shown in fig Q 03. A circular plug is used to seal the conduit. Determine the magnitude, direction and location of the force of the water on the plug.

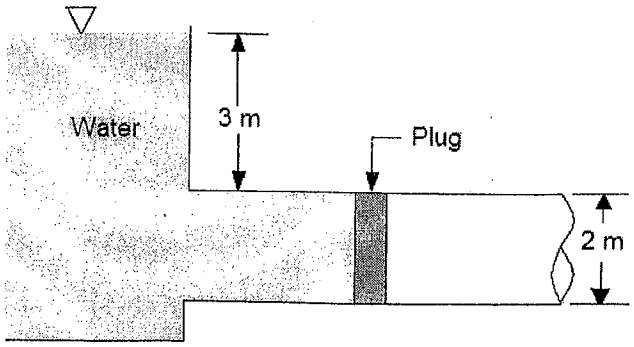
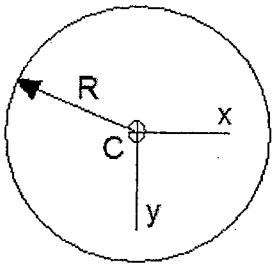


Fig Q 03

Data: Use the following geometric property of circle



$$I_{xc} = I_{yc} = \frac{\pi R^4}{4}$$

$$I_{xyc} = 0$$

(10 marks)

04) Calculate the water flow rate through the venturi meter shown in Fig Q 04, if ideal conditions exist.

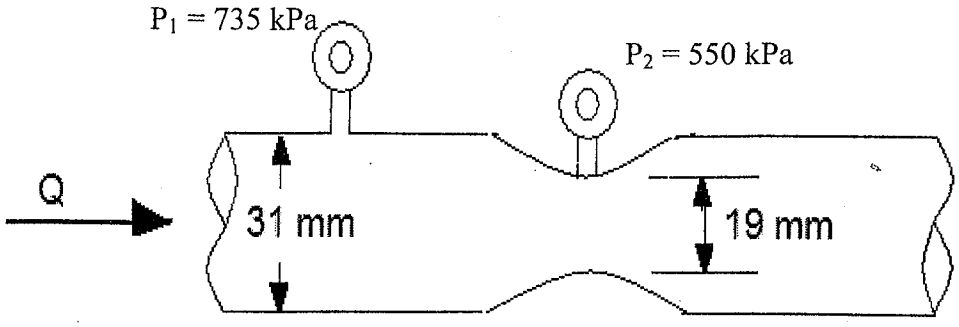


Fig Q 04

(20 marks)

05) The beam supports the distributed load as shown in Fig Q 05. Determine the resultant internal loadings acting on the cross section through point C. Assume the reactions at the supports A and B are vertical.

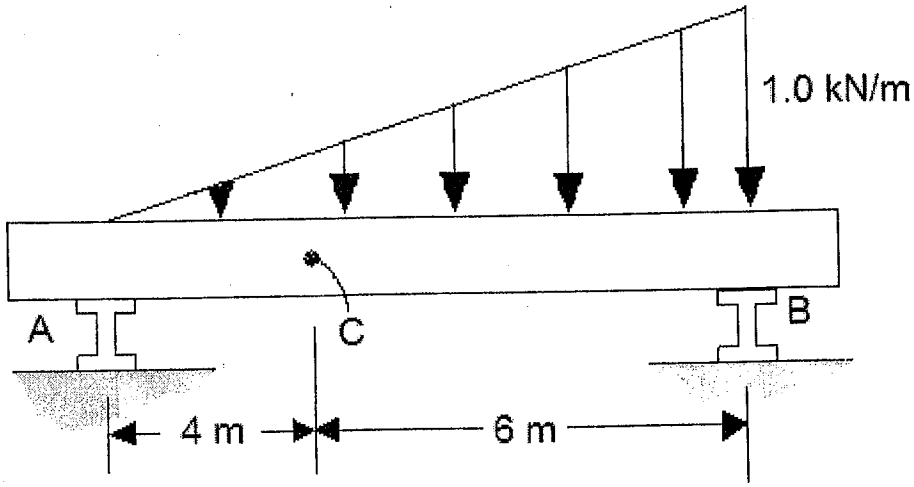


Fig Q 05

(20 marks)

06) I. Define the terms **Normal stress, Normal strain, Shear stress and Shear strain.**

(08 marks)

II. An aluminum rod shown in Fig Q 06 has a circular cross section and is subjected to an axial load of 10 kN. Determine the normal stress developed in the rod AB and BC.

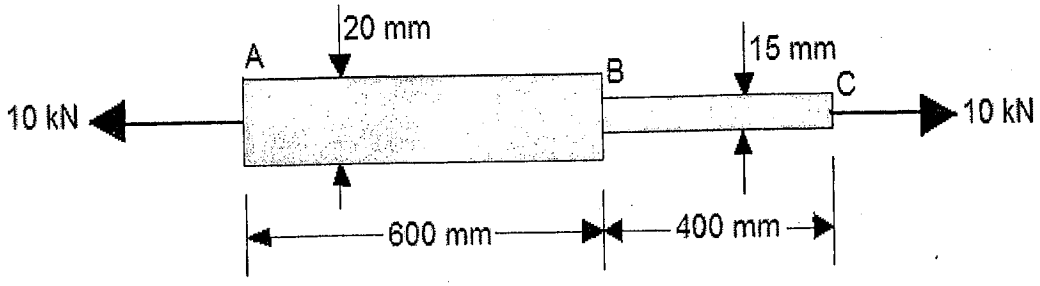


Fig Q 06

(12 marks)

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