Total No. of Questions : 8]

(8) MAY 2016

SEAT No. :

P3861

[Total No. of Pages : 2

[4960] - 1050

M.E. (Civil) (Water Resources & Environmental Engg.)

ENVIRONMENTAL HYDRAULICS & ENVIRONMENTAL STRUCTURES

(2013 Pattern) (Semester - II)

Time : 3 Hours] *[Max. Marks :50*

Instructions to the candidates:

1) ***Answer any five questions.***
2) ***Figures to the right indicate full marks.***
3) ***Use of electronic pocket calculators is allowed.***
4) ***Assume suitable data if necessary.***

Q1) a) Three-piston is pumping fluid with density of 1080 kg/m^3 from open tank to vessel under pressure 1.6 bar with flow rate of 2.2 m^3/hr. Geodetic head of fluid lift is 3.2m. Useful power consumed for fluid pumping is 4 kW. Value of head loss has to be found. **[6]**

b) Explain working of internal gear pump with sketch. **[4]**

Q2) a) Explain typical centrifugal compressor. **[4]**

b) Air leaving the impeller with radial velocity of 110 m/s makes an angle 25°30' with the axial direction. The impeller tip speed is 475m/s. The compressor efficiency is 0.80 & the mechanical efficiency is 0.96. Find the slip factor, overall pressure ratio, power required to drive the compressor. Neglect the power input factor & assume V_1 = 1.4, temperature t_{01} = 298k & the mass flow rate = 3kg/s. **[6]**

Q3) a) What are different type of actuator used in hydraulic circuit. **[4]**

b) Explain working of any two type of pressure reducing valves. **[6]**

Q4) a) Explain crystallization process. **[6]**

b) Write a short note on adsorption process. **[4]**

P.T.O.

Q5) A three story RC frame building with each story having 3.5m height, total load on each floor are 3000 kN on first floor, 3000 kN on second floor and 2500 kN on third floor & 2000 kN on roof floor. The soil below foundation is assumed to be hard rock. Find out the total base shear force as per IS code 1983 : 2002 (part I) **[10]**

Q6) a) Write formula for thickness of vessel on basis of maximum principal stress theory & maximum shear stress theory. **[4]**

b) Determine only forces acting on circular water tank resting on ground having capacity of 5000m^3. Height of tank is 4m. Use M30 concrete & Fe 250 steel. **[6]**

Q7) A hydraulic cylinder with an internal diameter 250mm is subjected to an internal pressure of 10MPa. Determine wall thickness based on **[10]**

a) Max. principal stress theory

b) Max. shear stress theory

c) Max. distortion energy theory of failure.

Compare the results with wall thickness calculated by thin cylinderassumption. Assume the yield stress of material = 60 MPa.

Q8) a) Write a short note on welded joints & their efficiency in pressure vessels. **[6]**

b) What are gasketed joints in cylindrical vessels. **[4]**