SEAT No. :

[5060] - 554

M.E. (Civil) (Water Resources and Environmental Engg.)
ENVIRONMENTAL HYDRAULICS AND ENVIRONMENTAL STRUCTURES
(2013 Pattern)

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

Instructions to the candidates :-
1) *Answer any 5 questions.*
2) *Figures to the right indicate full marks.*
3) *Assume suitable data, if necessary.*
4) *Use of electronic pocket calculator is allowed.*

Q1) Explain and compare the performance of reciprocating compressor and screw pump. **[10]**

Q2) a) A centrifugal compressor having inside diameter of 40mm and outside diameter of 82mm width of blade is 35mm. Temperature of air at inlet is 30°C, inlet and outlet angle of blade are 8° and 20°. Temperature in the pipe is 38°C and pressure ratio is 2. Determine power required to drive compressor. **[5]**

b) Write short note on strain gauges. **[5]**

Q3) a) What is PTFE? What is its common commercial name? State its advantages. **[5]**

b) Explain working of RTD with sketch. **[5]**

Q4) a) Discuss in detail the effectiveness no. of transfer units(NTU) with respect to heat exchanger. **[5]**

b) Explain crystallization process. **[5]**

Q5) a) Double acting cylinder is hooked in the regenerative circuit. The relief valve setting is 110 bars and the pum flow is 0.0018 cm³/sec. If the regenerative and retracting speed are equal to 0.30m/s. Find the piston and rod dia. area and also load carrying capacity for the **[5]**

      i)   Extending stroke

      ii) Retracting stroke

    b) Derive equation for pure bending of plate. **[5]**

Q6) a) Design an underground water tank 4.5m×11.5m×3.5m deep. The subsoil consists of sand having angle of repose of 30° & saturated unit weight of 18KN/m³. The water table is likely to rise up to ground level. Use M20 concrete and HYSD bars. Take unit weight of water as 9.81KN/m³. **[6]**

    b) Determine only forces acting on circular water tank resting ground having capacity of 6000cum. Height of tank is 5 meter. Use M30 concrete and Fe250 steel. **[4]**

Q7) a) Discuss in detail the nozzles & openings in pressure vessles. **[5]**

    b) What is LVDT? Explain its working. **[5]**

Q8) a) Derive expressions for principal stresses of thick cylinders. **[6]**

    b) Determine arc and depth of foundation required for square column carrying load of 550KN vertical. The SBC of soil is 230 KN/m². Density of soil 30KN/m³, Angle of repose is 20. **[4]**

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