

Code No: RT21354

R13**SET - 1**

II B. Tech I Semester Supplementary Examinations, Oct/Nov - 2017
GROUND WATER HYDROLOGY, WELLS AND PUMPS
(Agricultural Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**
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PART -A

1. a) Describe with neat sketches confined, semi confined (or leaky), unconfined and perched aquifers
- b) What do you understand by well development? Describe briefly the various methods of well development
- c) Describe with neat sketch a collector or radial well.
- d) Define indicator diagram. How will you prove that area of indicator diagram is proportional to the work done by the reciprocating pump?
- e) State the difference between a closed, semi open and open impeller
- f) Explain the term, 'Hydraulic devices'. Name any five hydraulic devices

PART -B

2. a) Explain the terms : (i) Cone of depression (ii) Radius of influence
(iii) Drawdown (iv) Secondary porosity
- b) The elevation of water table in an unconfined aquifer at two locations separated by a distance of 100 m is 1026.2 m and 1025.0 m respectively. If the permeability of the aquifer is 12 m/day and porosity is 15 per cent, what is the actual velocity of flow in the aquifer?
3. a) Define the terms critical depression head, working head, and specific capacity in the case of an open well.
- b) A well with a radius of 0.5 m penetrates completely a confined aquifer of thickness 40 m and permeability 30 m/day. The well is pumped so that the water level in the well remains at 7.5 m below the original piezometric surface. Assuming that the radius of influence is 500 m, compute the steady state discharge from the well
4. The water level in a well was depressed by pumping upto 3 m and level was raised by 1.5 m in 50 minutes after pumping. Determine the yield from the well if diameter is 2.5m and depression head is 2.5 m. Also find diameter of the well to yield 14 litres/sec under depression head of 3 m.

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5. a) What is negative slip in a reciprocating pump? Explain with neat sketches the function of air vessels in a reciprocating pump
- b) A single-acting reciprocating pump has a cylinder of a diameter 150 mm and of stroke length 300 mm. The centre of the pump is 4 m above the water surface in the sump. The atmospheric pressure head is 10.3 m of water and pump is running at 40 r.p.m. If the length and diameter of the suction pipe are 5 m and 10 cm respectively, determine the pressure head due to acceleration in the cylinder :
- (i) At the beginning of the suction stroke, and
- (ii) In the middle of the suction stroke
6. a) Why is the efficiency of a volute casing as an energy conversion device of a centrifugal pump low. How is a whirl pool or vortex chamber superior in performance?
- b) A centrifugal pump has an impeller 29cm diameter running at 960 r.p.m with an effective out let blade angle of 28° . The velocity of flow assumed constant throughout the system is 2 m/s. The static suction lift is 2.8 meters. The energy losses in meters of water are in suction pipe 0.6 m, in impeller 0.40 m, and in volute casing 0.88 m. Determine the reading of the pressure or vacuum gauge fitted (i) at inlet to the impeller (ii) at outlet to the impeller (i.e. on the clearance space between the impeller and the volute casing, and (iii) at the beginning of delivery pipe
7. a) Explain with the help of a neat sketch, the principle and working of the following hydraulic devices: (i) Hydraulic lift (ii) Hydraulic crane, (iii) Hydraulic coupling, and (iv) Hydraulic torque converter
- b) The water is supplied at the rate of 30 litres per second from a height of 4 m to a hydraulic ram, which raises 3 litres per second to a height of 18 m from the ram. Determine D' Aubuisson's and Rankine's efficiencies of the hydraulic ram.