Code No: RT21354 **R13** SET - 1

II B. Tech I Semester Supplementary Examinations, May/June - 2016
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) Briefly explain role of ground water in water resources development in country
   b) Describe with neat sketches confined, semi-confined, unconfined and perched aquifers
   c) A 400 mm diameter well fully penetrates a confined aquifer of permeability 40 m/day. The length of the strainer is 20 m. Under steady state of pumping the discharge from the well was 1500 liters per minute. Compute the drawdown at the well if the radius of influence of the well is 400 m.
   d) Differentiate: (i) Between a single-acting and double -acting reciprocating pump, (ii) Between a single cylinder and double cylinder reciprocating pump
   e) Give a layout of a pumping installation and name the main accessories
   f) Explain the term, 'Hydraulic devices'. Name any five hydraulic devices

PART -B

2. a) Distinguish between
   (i) Water table and piezometric surface (ii) Vadose zone and Phreatic zone
   (iii) Artesian well and flowing well (iv) Influent and effluent streams.
   b) An undisturbed rock sample has an oven-dry weight of 1305 gm. When it is completely saturated with kerosene it weighted 1463 gm. The saturated sample, when immersed in kerosene displaced 605 gm of kerosene. What is the porosity of the sample?

3. a) What do you understand by safe yield of a groundwater basin? What are the factors influencing the safe yield? What is meant by overdraft and mining?
   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.
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4. During a recuperation test, water level is depressed by pumping to 3.5 m and recuperated 2.5 m in 75 minutes. Determine the yield from the yield from the well of diameter 5.5 m under depression head of 3.5 m. Find also the diameter to yield a diameter of 14 litres/sec under a depression head of 3 m.

5. a) Draw an indicator diagram, considering the effect of acceleration and friction in suction and delivery pipes. Find an expression for the work done per second in case of single-acting reciprocating pump

   b) A single-acting reciprocating pump running at 30 r.p.m., delivers 0.012 m^3/s of water. The diameter of the piston is 25 cm and stroke length is 50 cm. Determine: (i) The theoretical discharge of the pump, (ii) Co-efficient of discharge, and (iii) Slip and percentage slip of the pump.

6. a) What are various methods adopted to increase the efficiency of a centrifugal pump by different types of efficiencies used in reference of a centrifugal pump

   b) A centrifugal pump has an impeller 29 cm diameter running at 960 r.p.m. with an effective outlet blade angle of 28^0. 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 neat sketch, the working of air lift pump. Mention its advantages

   b) The water is supplied at the rate of 30 liters 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