R13

SET - 1

II B. Tech I Semester Supplementary Examinations, May - 2019
GROUND WATER HYDROLOGY, WELL 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**

~~~~~~

PART –A

1. a) Distinguish between ground water and perched ground water.   (3M)
    b) Describe in brief various methods of developing a tube well.   (3M)
    c) How can you estimate the aquifer parameters for steady flow condition?   (4M)
        Explain.
    d) Write short notes on working of a reciprocating pump.   (4M)
    e) Explain on what basis pump being selected and also discuss about their   (4M)
        installation.
    f) Write short notes on mixed flow pumps with neat sketch.   (4M)

PART –B

2. a) Explain in brief the equations of the aquifer parameters.
    b) On a particular day, in a field well the initial water table was observed 6 meters
        below the ground water level. The water table was lowered 8 meters below the
        ground surface when quantity of 4, 00.000 cubic meters of water was pumped
        per square kilometer. Compute the specific yield, specific retention of soil
        assuming the porosity as 30% and there are no other losses.

3. a) Explain with suitable sketches the collector wells and infiltration galleries.
    b) Design a tube-well for the following data :
        (i) Yield required = 0.08 cumec, (ii) Thickness of the confined aquifer: 30 m,
        (iii) Radius of circle of influence = 300 m, (iv) Permeability coefficient = 60
        m/day, (v) Draw-down=5m.

4. a) Develop an equation relating the steady state discharge from a well in an
        unconfined aquifer and depths of water table at two known positions from the
        well.
    b) A confined aquifer is 35m thick and 3 km wide. Two observation wells located 2 km
        apart in the direction of flow indicate heads of 45 m and 39.5m. If the coefficient of
        permeability of the aquifer is 40m/day. Calculate the total daily flow through the aquifer
        is 40m/day and the piezometric head at an observation well located 400 m from the
        upstream well.

5. a) Explain ditch and furrow method and flooding method of artificial recharge.

   b) The total base flow, in response to rainfall of 1222mm, from a catchment area of 490sq.km, is $136 \times 10^6 m^3$. The ground water extraction within the catchment area is $5.94 \times 10^6 m^3$. Return circulation from irrigation contributes $32.6 \times 10^6 m^3$. Estimate the rainfall-infiltration factor, neglecting other sources of recharge and discharge.

6. a) Discuss effect of change of impeller dimensions of a centrifugal pump on performance characteristics.

   b) A centrifugal pump delivers water against a total head of 12m at a design speed of 1500rpm. The vanes are curved backwards and make an angle of 30^0 with the tangent at the outer periphery of the impeller. The impeller diameter is 30cm and has a width of 5cm at the outlet. If the Manometric efficiency and overall efficiency are 96% and75%, estimate the discharge of pump and power required to drive the pump.

7. a) Write short notes on selection of pump considering cost as criteria.

   b) The water is supplied from a supply tank to a hydraulic ram at the rate of 40 litres/s, which rises 4litres/s to a delivery tank. If the heights of supply and delivery tank from the ram are 3m and 22m respectively, find the Rankine efficiency of the ram.