Reg.No. \_\_\_\_\_\_\_\_\_\_\_\_



**UNIVERSITY**

(Karunya Institute of Technology & Sciences)

(Declared as Deemed-to-be University under Sec.3 of the UGC Act, 1956)

**End Semester Examination – Nov/Dec – 2016**

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|  |  | **Semester :** | **2016-17 ODD** |
| **Code :** | **16CE3004** | **Duration :** | **3hrs** |
| **Sub. Name :** | **ELEMENTS OF HYDROLOGY** | **Max. marks :** | **100** |

**ANSWER ALL QUESTIONS (5 x 20 = 100 Marks)**

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| **Q. No.** | **Sub Div.** | **Questions** | | **Course**  **Outcome** | **Marks** |
| 1. | a. | Explain the land-based components of the hydrologic cycle with a sketch. | | CO 1 | 8 |
| b. | How is rainfall caused due to the mechanisms of movement of moisture-laden clouds? | | CO 1 | 12 |
| **(OR)** | | | | | |
| 2. | a. | Sketch a recording raingauge and explain its functioning. | | CO 1 | 8 |
| b. | How will you use the Theisson polygon method to estimate the rainfall in an area with six raingauges? | | CO 1 | 12 |
| 3. | a. | Draw typical curves to represent the cumulative infiltration and infiltration rate. | | CO 1 | 8 |
|  | b. | With the help of a sketch describe the functioning of double-ring infiltrometer. | | CO 1 | 12 |
| **(OR)** | | | | | |
| 4. | a. | How will you measure the evaporation using US Class-A evaporation pan? Use a sketch to highlight. | | CO 1 | 8 |
|  | b. | Give the Thorthwaite formula initially developed to estimate PET. | | CO 1 | 12 |
| 5. | a. | Define Darcy’s law and list down its limitations. | | CO 1 | 3 |
|  | b. | Explain how permeability value may be obtained using constant head permeameter. Derive the formula. | | CO 1 | 5 |
|  | c. | Write short notes on   1. Porosity 2. Water table and piezometric head 3. Storativity and specific yield 4. Homogenous and heterogenous aquifers | | CO 3 | 6 |
|  | d. | A confined aquifer has a thickness of 30 and a porosity of 32%. If the bulk modulus of elasticity of water and formation material are 2.2x10-5 and 7800 N/cm2 respectively. Calculate the storage coefficient. | | CO 3 | 3 |
|  | e. | | Differentiate between steady state and unsteady state flow. | CO 3 | 3 |
| **(OR)** | | | | | |
| 6. | a | Derive the expression of determination of equivalent vertical and horizontal hydraulic conductivity | | CO 3 | 5 |
|  | b | Write short notes on   1. Total head, pressure head and elevatin head 2. Types of aquifers | | CO 3 | 5 |
|  | c | | A confined stratified aquifer has a total thickness of 12 m and is made up of three layers. The bottom layer has a coefficient of permeability of 30 m/day and a thickness of 5.0 m. The middle layer has a coefficient of permeability of 30 m/day and a thickness of 5.0 m. The middle and top layers have permeability of 20 m/day and 45 m/day respectively and are of equal thickness. Calculate the transmissivity of the confined aquifer and the equivalent permeability, if the flow is along the stratification | CO 3 | 10 |
| 7. | a | What are Dupit’s assumptions? | | CO 3 | 3 |
|  | b | The drawdown time deata recorded ata an observation well situated at a distance of 50 m from the pumping well is given below.   |  |  |  |  |  |  |  |  |  | | --- | --- | --- | --- | --- | --- | --- | --- | --- | | Time in min | 1.5 | 3 | 4.5 | 6 | 10 | 20 | 40 | 100 | | Drawdown in m | 0.15 | 0.6 | 1.0 | 1.4 | 2.4 | 3.7 | 5.1 | 6.9 |   If the well discharge is 1800 lpm, calculate the transmissibility and storage coefficient of the aquifer. | | CO 3 | 8 |
|  | c | Explain in detail about groundwater budgeting. | | CO 1 | 6 |
|  | d | How the pumping test will be carried out? | | CO 3 | 3 |
| **(OR)** | | | | | |
| 8. | a | Estimate the discharge of a well pumping water from a confined aquifer of thinckness 20 m with the following data:  Distance of observation well from the pumping well = 100 m  Drawdown at the observation well after 4 hours of pumping = 1.5 m  Drawdown at the observation well after 16 hours of pumping = 2.0 m  Storage coefficient, S =0.0003 | | CO 3 | 5 |
|  | b | Write short notes   1. Drawdown 2. Radius of influence 3. Transmissivity and storativity | | CO 3 | 5 |
|  | c | Explain the step by step procedure in determining aquifer parameters using Theis method | | CO 3 | 6 |
|  | d | In a field test, a time of 6 hours was required for a tracer to travel between two observation wells 42 m apart. If the difference in water-table elevation in these wells were 0.85 m and the porosity of the aquifer is 20% calculate the coefficient of perameability of the aquifer | | CO 3 | 4 |
|  | | **Compulsory:** | |  |  |
| 9. | a. | Highlight the importance of streamflow data in hydrologic studies and give different methods used for measurement of this phenomenon. | | CO 2 | 10 |
|  | b. | How will you measure streamflow in the field using stage-discharge method? | | CO 2 | 10 |

ALL THE BEST