

SEMESTER VI
MAJOR COURSE – MJ 13
HYDROGEOLOGY AND ENGINEERING GEOLOGY
Full Marks: 75 Time: 3 Hours

GROUP – A

Q1. Choose the correct answer:

1. The movement of groundwater through pores and fractures is called:
(a) Infiltration (b) Percolation (c) Evaporation (d) Condensation **(1 mark)**
2. Darcy's law relates groundwater discharge mainly with:
(a) Hydraulic gradient (b) Temperature (c) Salinity (d) Rainfall only **(1 mark)**
3. Which parameter expresses the ease with which water can flow through a soil or rock?
(a) Porosity (b) Permeability (c) Specific yield (d) Storage coefficient **(1 mark)**
4. The zone completely saturated with groundwater is called:
(a) Vadose zone (b) Capillary zone (c) Phreatic zone (d) Aeration zone **(1 mark)**
5. A dam constructed across a river valley for storage of water is commonly called:
(a) Earth dam (b) Storage dam (c) Arch dam (d) Buttress only **(1 mark)**

Q2. Explain the hydrologic cycle and discuss the role of precipitation, evapotranspiration, run-off and infiltration in groundwater recharge. (5 marks)

Q3. Define porosity, permeability, specific yield and specific retention. Explain their significance in groundwater studies. (5 marks)

GROUP – B

Answer any four questions. (4 × 15 = 60)

Q4. Explain the occurrence and movement of groundwater. Discuss the vertical distribution of subsurface water and different types of aquifers. **(15 marks)**

Q5. State Darcy's law and derive its basic relationship. Explain hydraulic conductivity, intrinsic permeability and the factors controlling groundwater flow. **(15 marks)**

Q6. Discuss groundwater exploration methods. Explain surface-based methods, electrical resistivity methods and the role of borehole logging in groundwater exploration. **(15 marks)**

Q7. Describe groundwater chemistry and water quality. Discuss methods of interpreting groundwater-quality data and explain seawater intrusion in coastal aquifers. **(15 marks)**

Q8. Explain engineering geology and its applications. Discuss basic concepts of rock mechanics, rock mass classification and engineering properties of soils. **(15 marks)**

Q9. Describe dams and reservoirs. Discuss geological considerations in dam-site selection, foundation and seepage problems, reservoir problems, slope stability and bridge-site investigations. **(15 marks)**