

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 hydraulic gradient is the change in hydraulic head per unit:
(a) Area (b) Distance (c) Volume (d) Time **(1 mark)**
2. Transmissivity is related to the ability of an aquifer to:
(a) Transmit water (b) Store heat (c) Resist erosion (d) Produce minerals **(1 mark)**
3. Water balance studies are useful for estimating:
(a) Groundwater recharge and discharge (b) Rock age only (c) Soil colour (d) Earthquake magnitude **(1 mark)**
4. R.M.R. is a system used for classification of:
(a) Rock masses (b) Groundwater chemistry (c) Soil colour (d) River discharge **(1 mark)**
5. A tunnel constructed through rock requires detailed study of:
(a) Geology and rock conditions (b) Only rainfall (c) Only vegetation (d) Only temperature **(1 mark)**

Q2. Explain Darcy's law and hydraulic gradient. Mention the factors controlling groundwater flow. (5 marks)

Q3. What is groundwater management? Explain the importance of artificial recharge and rainwater harvesting. (5 marks)

GROUP – B

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

- Q4. Describe the hydrologic cycle and occurrence of groundwater. Explain aquifer types and important aquifer parameters. (15 marks)**
- Q5. Discuss well hydraulics and groundwater flow. Explain transmissivity, storage coefficient, specific capacity and drawdown. (15 marks)**
- Q6. Explain groundwater exploration and interpretation of groundwater-quality data. Discuss graphical methods and seawater intrusion in coastal aquifers. (15 marks)**
- Q7. Discuss groundwater management and sustainable development. Explain surface-subsurface interaction, groundwater-level fluctuations and water-balance studies. (15 marks)**
- Q8. Explain the scope of engineering geology. Discuss rock mechanics, engineering properties of soils and building stones, and rock-mass classification systems. (15 marks)**
- Q9. Discuss geological considerations in dams, reservoirs, tunnels, roads and bridges. Explain dam foundation, seepage, reservoir problems, slope stability and bridge-site geology. (15 marks)**