

M.E. MECHANICAL ENGINEERING FIRST YEAR SECOND SEMESTER - 2025**Subject : ADVANCED HYDRO POWER****Time : 3hours****Full Marks :100*****Answer any five questions*****1. a) Explain a recording type rain gauge with a neat sketch.****b) Calculate the average precipitation by the average method and Thiessen Polygon method from the following data :**

Station No.	Precipitation (mm)	Area (sq. km)
1	67	82
2	85	80
3	93	92
4	117	75
5	130	32
6	52	50

c) Explain the method of isohyets for determining the average rainfall of a region.**d) How the rainfall of an area can be represented ?****7 + 6 + 3 + 4****2. a) How would you place hydro power in the mix of different powers ?**

[Turn over

b) Explain hydrologic cycle with a neat diagram.

c) What are the basic advantages of Hydel Power ?

d) Explain detention and depression storage .

3 + 9 +4 +4

3, a) Describe the principle of working of an evaporation pan .

b) Discuss Horton's equation for infiltration along with infiltration curve.

c) Explain the method of ϕ -index.

d) When a run-of-river plant operates as a peak load station with a weekly load factor of 20 %, all its capacity is firm capacity. What will be the minimum flow in the river so that station may serve as the base load station? It is given that

Rated installed capacity of generator = 10,000 kW

Operating head = 15m

Plant efficiency = 80 %

Estimate the daily load factor of the plant if the stream flow is 15 cumec

6+ 4 +3 +7

4. a) Explain the phenomenon of water hammer.

b) Derive an expression for pressure rise due to sudden closure of valve considering the pipe material to be elastic.

c) Explain the working principle of surge tank.

d) Write about different types of surge tank.

3 + 10 +3 +4

5. a) Why banded penstocks are used ?

b) How can you determine the number of penstocks ?

c) What is economical diameter of penstock ?

d) How can you determine economical diameter of penstock analytically ?

2 + 3 +3 +2 +10

6. a) What is the basic principle of Tidal Power generation ?

b) What should be the criteria for the location of tidal power plant ?

c) Discuss the difficulties in tidal power generation.

d) Explain single Ebb cycle system of tidal power generation.

e) How can you estimate energy and power developed in a tidal power plant. **4 + 5 +3 +5 + 3**

7. a) How would you estimate the storage capacity of a reservoir from mass curve ?

b) How can calculate the yield from the reservoir from mass curve ?

c) Explain Unit Hydrograph method .

d) What are the assumptions in Unit hydrograph method ?

c) Write about the limitations of UH method . **4 +4+3 +5+4**

8. Write short notes on any four of the followings :

a) Pumped storage plant,

b) D-A-D curve and mass curve

c) Evaporation Pan,

d) Thiessen Polygon method of processing precipitation data,

e) Infiltrimeter,

f)) Radar measurement of rainfall

g) D-A-D curve and mass curve **(4 x 5)**