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320679(20)

B. E. (Sixth Semester) Examination, April-May 2021

(New Scheme)

(Civil Engg. Branch)

WATER POWER ENGINEERING

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : Answer all questions. Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d).

Unit-I

1. (a) Explain in short how hydro-power is developed?   2

    (b) State the names of power plants [Classification] on the basis of fuels used to rotate the prime mover. 7

(c) Explain the importance of hydrology for planning of any hydro-power project. 7

(d) The following data of mean monthly flow λ in m³/sec is available for the driest period/year of the river site for 12 months (Jan. to Dec.)

300, 280, 200, 140, 100, 340, 360, 900, 600, 500, 450, 400.

Assuming the head of 10 m and plant efficiency η as 90%, find out 100% dependable power generation for a base load plant and total energy available in a year with help of flow duration curve. 7

Unit-II

2. (a) Explain Stage Vs. Discharge curve. 2

(b) Explain the method of finding maximum capacity of reservoir at a river site with help of mass curve of discharge. 7

(c) Given below are the observed flows from an isolated storm of 6-hr. duration on a stream with the catchment area of 500 sq.-km.

Time (hr)	0	6	12	18	24	30	36	42	48	54	60	66	72
Flow (m³/s)	0	100	250	200	150	100	70	50	35	25	15	05	0

Assume the base flow to be zero, derive the ordinates of a 6 hr. unit hydrograph. 7

(d) Daily flow in river is constant at 15 cumec. What would be firm capacity of a run of river plant to be used as a 8 hour peaking station? What would be the pondage factor and magnitude of pondage required?

Assume the net head to be 10 m and plant efficiency as 80%. 7

Unit-III

3. (a) State the measuring unit and formula for Power and Energy. 2

(b) The load on hydel plant varies from a minimum of 10000 kW to a maximum of 35000 kW. Two turbo generators of capacity 22000 kW each have been installed.

Calculate :

(i) Total installed capacity

[4]

(ii) Plant use factor

(iii) Maximum demand

(iv) Load factor

(v) Utilisation factor

7

(c) Describe pumped-storage plant and it's advantages. 7

(d) With help of neat sketch, show the constructional features of Valley Dam Plant and Diversion Canal Plant.

7

Unit-IV

4. (a) What is the function of Surge Tank?

2

(b) A rigid pipe is 3·20 km long. The velocity of the flow is 1·20 m/sec. Calculate the rise in pressure behind a valve at the lower end if it is closed (i) In 20 seconds (ii) In 3 seconds. Take bulk modulus of water $K = 2000$ kN/mm^2.

7

(c) Describe the factors influencing the location and alignment of conveyance pipe.

7

(d) Describe in brief Wood-stave and Steel Penstocks used in Hydropower plants.

7

[5]

Unit-V

5. (a) What is gantri girder?

2

(b) Discuss the basic objectives of Power House planning.

7

(c) Discuss the conditions governing for the suitability of a Underground Power House.

7

(d) Describe in brief components of Intermediate structure of an Indoor Power House.

7