Sixth Semester B-tech (Civil) -2013 Scheme

13.601 Design of Hydraulic Structures **Time 4 hours**

(Model Questions) **100 Marks**

Part A

(Answer all questions)

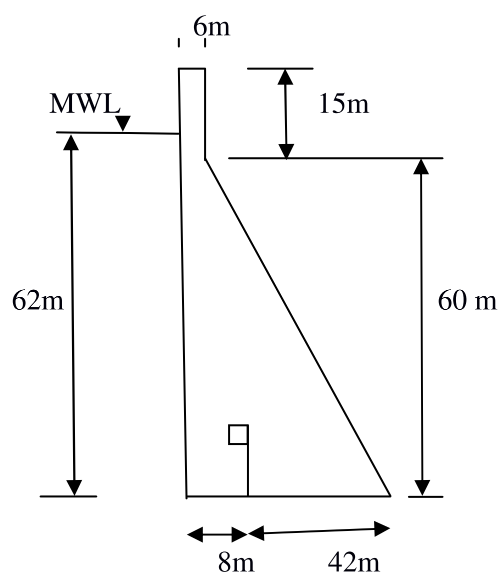
1. What would be the maximum height of an elementary profile of a gravity dam if the safe compressive stress for the masonry is 1.5 Mpa? Assume unit weight of masonry as 23 kN/m^3.
2. Discuss the limitations of Bligh's creep theory.
3. Show that, as per thin cylinder theory , the most economical central angle of an arch dam is $133^{o}\,34'$
4. What are the corrections to be applied for computing the uplift pressure below hydraulic structures using Khosla's theory ? Explain .
5. Explain different Types of Cross Drainage Works 4x5=20

Part B

(Answer one question out of the two from each module)

Module I

6.



Check the stability of the gravity dam shown in the figure above for reservoir full condition. Assume co-efficient of friction =0.75. Consider only the weight of dam, Water pressure and uplift pressure. Take average shear strength $q = 1.4 N/mm^2$ and density of concrete 24 kN/m^3. 10

OR

7. Design a constant angle arch dam by thick cylinder theory for a valley with bottom width 50m and top width of 250m at a height of 100 m . Permissible stress is $5000 kN/m^2$ 10

Module II

8. A hydraulic structure built on fine sand (C = 15) has the following detail:

Total length of the floor = 30m, a weir at 5m from u/s end, effective head of water 3m, sheet pile at u/s end 4m deep, sheet pile at d/s end 5m deep, intermediate piles at 12m from u/s end 3m deep. Determine (a) whether the percolation gradient is safe, (b) uplift pressures at A = 5m, B = 15m and C = 20m from upstream end and corresponding thicknesses of floor using Bligh's theory. 10

OR

9. Discuss the various causes of failure of weirs constructed on permeable soils and suggest remedial measures. 10

Part C

(Answer one full question out of the two from module III)

Module III

10. a) A cross drainage work is to be designed for the following data.

Canal details	**Drain details**
Discharge = $354\ m^3/sec$	Maximum flood discharge = 600 cumecs
Full supply level = 207.600m	Bed level = 203.600
Bed level =201.400	High flood level = 206.300
Bed width =24 m	

Side slopes on either side = 0.5H: 1V 30

b) Draw to scale the following views:

1) Half plan at top and half at foundation
2) Longitudinal section along the canal. 30

OR

11. a) Design a canal drop of 2m with the following data.

Hydraulic particulars of the canal above drop

Full supply discharge	4 cumecs
Bed width	6.00 m

Bed level	10.000
Full supply depth	1.50 m
Full supply level	11.500
Top of bank	2.00m wide at level 12.500
Half supply depth	1.00 m

Hydraulic particulars of the canal below drop

Full supply discharge	4 cumecs
Bed width	6.00m
Bed level	8.000
Full supply depth	1.50 m
Full supply level	9.500
Top of bank	2.00m wide at level 10.500

Good soil is available for foundation at 8.50 30

b) Draw to scale the following views:

i) Half plan at top and half plan at foundation.

ii) Longitudinal sectional elevation of the drop. 30