

Code :R7420109

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IV B.Tech II Semester(R07) Regular Examinations, April 2011
DESIGN & DRAWING OF HYDRAULIC STRUCTURES
(Civil Engineering)

Time: 3 hours

Max Marks: 80

Answer any ONE questions
All questions carry equal marks

- Design a sloping glacis weir for the following data obtained at the site and draw plan at top and longitudinal section
 Maximum discharge intensity on weir crest is 12.5 cumecs/m.
 HFL before construction of weir = 225.00m
 River bed level =218.75m
 Pond level =224.00m
 Height of crest shutters =1.5m
 Anticipated downstream water level in the river when the weir is discharging with pond level upstream =221.50m
 Bed retrogression =0.5m
 Lacey's silt factor =0.9
 Permissible exit gradient=1/7
 Permissible afflux= 1m.

- Design and draw half plan at top and longitudinal section of a canal regulator with the following data.

	U/S canal	D/S canal
Full supply discharge	20m ³ /sec	16m ³ /sec
Bed width	15m	15m
Full supply depth	2m	1.75m
Bed level	+20.00m	+20.00m
Full supply level	+22.00m	+21.75m
Top level of bank	+23.00m	+22.75m

Top widths of banks on the upstream and downstream side are same. The regulator carries a road way single lane designed for 1 RC loading class A. Provide clear free board of one metre above FSL for the road bridge. Right bank is 5 metres wide and left bank is 2 metres wide. Good foundation soil is available at +19.00m. Assume the ground level at site as +22.00m

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1. Design and draw half plan at foundation and longitudinal section of the sluice through the barrel of a tank sluice with tower head with the following data.

Ayacut = 200 hectares.

Duty = 1000 hectares/cumec

Tank bund top width = 2m

Tank bund side slopes 2:1

Top level of bank = +40.00m

Ground level at the site = + 34.50m

Good hard soil for foundation is available at +33.50m.

Sill of the sluice at off take = +34.00m

Maximum water level in the tank = +38.00m

Full tank level = +37.00m

Average low water level of the tank = +35.00m

The details of the channel below the sluice are:

Bed level = +34.00m

Full supply level = +34.50m

Bed width = 1.25m

Side slopes = 1.5:1

Top of bank = +35.50m

2. Design and draw half plan at foundation level and longitudinal section across Syphon barrel of a Syphon Aqueduct type III with the following data.

Canal Details:

Discharge = $35\text{m}^3/\text{sec}$

Bed width = 20.22m

Bed level = +40.00m

Full supply level = +42.00m

Ultimate full supply level = +42.50m

Average velocity in the canal = $0.83\text{m}/\text{sec}$

Left bank top width = 5.00m

Right bank top width = 2.00m

Canal side slopes both inside and outside are 2:1 in embankment with minimum cover of 1.00m one the hydraulic gradient.

Top of canal bank = +43.50m

Drain Details:

Catchment area = 8.0 square km.

Maximum flood discharge = $60\text{m}^3/\text{sec}$.

Maximum flood level of the drain at the site of crossing = +39.75m

Hard soil is available at +37.00m.

Average ground level on flanks of drain = +38.00m

Bed level of drain = +38.00 m at the point of crossing.

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1. Design and draw plan and longitudinal section of a type-III syphon aqueduct for the following data.

Discharge of the canal = $30\text{m}^3/\text{sec}$

Bed width of canal = 20m

Depth of water in the canal = 1.5m

Bed level of the canal = 165.0m

High flood discharge of the drainage = $450\text{m}^3/\text{sec}$

High flood level of the drainage = 166.00m

Bed level of the drainage = 163.00m

General ground level = 165.00m

Assume any other suitable data not given.

2. Design and draw half plan at bottom and longitudinal section of a canal drop notch type with the following data. Canal details:

	U/S	D/S
Full supply discharge	$4.2\text{ m}^3/\text{sec}$	$4.2\text{ m}^3/\text{sec}$
Bed width	6.0m	6.0m
Bed level	+10.0m	+8.0m
Full supply depth	1.5m	1.5m
Full supply level	+11.5m	+9.5m
Top of bank 2m wide at level	+12.5m	+10.5m
Half supply depth	1.0m	1.0m

Good soil is available for foundation at +8.5m

The ground level at the site of work is + 10.50m

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1. Design and draw half plan at bottom and longitudinal section of a canal drop notch type with the following data.

	U/S of drop	D/S of drop
Discharge	4cumecs	4cumecs
Bed width	6.0m	6.0m
Bed level	+10.00m	+8.00m
Full supply depth	1.5m	1.5m
Full supply level	+11.5m	+9.5m
Full board	1.0m	1.0m

The ground level at the site of work is +10.50m
 Good soil for foundation is available at +8.50m
 Half supply depth may be taken as 1.0m.

2. Design and draw half plan at bottom and longitudinal section of a tank surplus weir with the following data.

Combined catchment =26km²

Intercepted catchment =20km²

Full tank level =+6.70m

Maximum water level =+7.50m

Ground level =+5.80m

Foundation level =+4.2m

Tank bund level =+8.9m

Top width of bund =1.8m

Slope on either side of bund=2:1

D/S level is +4.8m in a distance of 8m.
