Code: 9A01802

1

B.Tech IV Year II Semester (R09) Regular Examinations, March/April 2013

DESIGN & DRAWING OF IRRIGATION STRUCTURES

(Civil Engineering)

Time: 3 hours Max Marks: 70

Answer any ONE question

All questions carry equal marks

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1 Design a sloping glacis weir for the following data and draw plan at top and longitudinal section.

Hydraulic particulars	U/S canal	D/S canal
Full supply discharge	7.5 m^3/s	7.5 m^3/s
Bed width	6.0 m	6.0 m
Bed level	+ 10.00 m	+ 8.00 m
Full supply depth	1.5 m	1.5 m
F.S.L	+ 11.50 m	+ 9.50 m
Top level of bank	+ 12.50 m	+ 10.50 m

Hard soil is available for foundation below + 8.00 level.

2 Design a tank sluice with tower head for the data given below:
Ayacut cut to be irrigated = 200 ha
Duty = 900 ha/cumec
Top width of tank bund = 2 m with 2:1 side slope.
The top level at the site = + 140.00
The ground level at the site = + 130.00
Hard soil for foundation = + 133.00
The sill of the sluice at off take = + 133.50
The maximum water level in tank = + 138.00
Full tank level = + 137.25
Average low water level in the tank = + 134.25
The channel bed level = + 133.50
Bed width of the channel = 1.2 m
Full supply level = + 134.00
Side slopes of the channel = 2:1 with the top of bank at + 135.00
Draw the following:
(i) Half plan at top and longitudinal section of the sluice barrel.

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DESIGN & DRAWING OF IRRIGATION STRUCTURES

(Civil Engineering)

Time: 3 hours Max Marks: 70

Answer any ONE question

All questions carry equal marks

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1 Design a surplus weir for a minor tank forming a group of tanks with the following available information:

Combined catchment area	= 25.89 km^2
Intercepted catchment area	= 20.71 km^2
Top width of bund	= 2 m
Side slopes of the bund	= 2:1 on both sides
Top level of bund	= + 14.50
Maximum water level	= + 12.75
Full tank level	= + 12.00
General ground level at the site	= + 11.00
Ground level slopes off to a level	= + 10.00 in about 6 m distance
The foundations are of hard grovel	= + 9.50
Saturation gradient	= 5:1 with 1 m clear cover

Provisions are to be made to store water M.W.L in times of necessity.

Draw the following:

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

(ii) Section across weir.

2 Design a tank sluice with tower head for the data given below:

Ayacut to be irrigated	= 200 ha
Duty	= 1000 ha/cumec
Top width of tank bund	= 2 m with 2:1 side slope
The top level of tank	= + 40.00
The ground level at the site	= + 34.50
Hard soil for foundation	= + 33.50
The sill of the sluice at off take	= + 34.00
The maximum water level in tank	= +38.00
Full tank level	= + 37.00
Average low water level in the tank	= + 35.00
The channel bed level	= + 34.00
Bed width of the channel	= 1.25 m
Full supply level	= + 34.50
Side slopes of the channel	= $1\frac{1}{2}$:1 with top of tank at + 35.50

Draw the following:

(i) Half plan at top and longitudinal section of the sluice barrel.

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B.Tech IV Year II Semester (R09) Regular Examinations, March/April 2013

DESIGN & DRAWING OF IRRIGATION STRUCTURES

(Civil Engineering)

Time: 3 hours Max Marks: 70

Answer any ONE question

All questions carry equal marks

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1 Design a surplus weir for a minor tank forming a group of tanks with the following available information:

Combined catchment area	= 35 km^2
Intercepted catchment area	= 10 km^2
Top width of bund	= 2 m
Side slopes of the bund	= 2:1 on both sides
Top level of bund	= + 12.25
Maximum water level	= + 10.75
Full tank level	= + 10.00
General ground level at the site	= + 8.50
Ground level slopes off to a level	= + 8.00 in about 6 m distance
The foundations are of hard gravel	= + 7.00
Saturation gradient	= 5:1 with 1 m clear cover

Provisions are to be made to store water M.W.L in times of necessity.

Draw the following: (i) Half plan at foundation.(ii) Longitudinal section.

2 Design and draw half plan at foundation level and longitudinal section across siphon barrel of a siphon a product type-III with the flowing data:

Canal details:

Discharge	= 35 cumec
Bed width	= 20.00 meters
Bed level	= + 40.00
Full supply level	= + 42.00 m
Ultimate bed level	= + 39.75 (U.B.L)
Ultimate full supply level	= + 42.50 (U.F.S.L)
Average velocity in the canal	= 0.83 m/sec
Left bank top width	= 5.00 meters
Canal side slopes both inside and outside	= 2:1 in embankment with outside minimum cover of 1 m over the hydraulic gradient.
Top of canal bank	+ 43.50

Drain details:

Catchment area	= 8.0 km^2
Maximum computer discharge	= 60 m^3/sec
Maximum flood level of the drain at the site crossing	= + 39.75(observed)
Hard soil available at	= + 37.00
Average ground level on flanks of drain	= + 38.00

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B.Tech IV Year II Semester (R09) Regular Examinations, March/April 2013

DESIGN & DRAWING OF IRRIGATION STRUCTURES

(Civil Engineering)

Time: 3 hours Max Marks: 70

Answer any ONE question

All questions carry equal marks

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1 Design a canal drop (notch type) of 2 m with the following data and draw half plan at top and longitudinal section.

Hydraulic particulars	U/S canal	D/S canal
Full supply discharge	4.0 m^3/s	4.0 m^3/s
Bed width	6.0 m	6.0 m
Bed level	+ 10.00 m	+ 8.00 m
Full supply depth	1.50 m	1.50 m
Full supply level	+ 11.50 m	+ 9.50 m
Top level of bank	+ 12.50 m	+ 10.50 m
Top width of bank	2 m	2 m
Half supply depth	1.0 m	1.0 m

Ground level at the site = + 10.50 m

Good soil for foundation is available at = + 8.50 m

2 Design a regulator-cum-road bridge with the following data and draw half plan at foundation and longitudinal section.

Hydraulic particulars	U/S canal	D/S canal
Full supply discharge	20 m^3/s	16 m^3/s
Bed width	15.0 m	15.0 m
Bed level	+ 20.00 m	+ 20.00 m
Full supply depth	2 m	1.75 m
Full supply level	+ 22.00	+ 21.75
Top level of bank	+ 23.00	+ 22.75

Top widths of banks are the same as those on the upstream side. The regulator carries a road way single lane designed for I.R.C loading class 'A'. Provide clear free board of one meter above F.S.L for the road bridge.

The right bank is 5 m wide and left bank is 2 m wide on both U/S and D/S. Good foundation soil is available at + 19.00 m and ground level + 22.0 m.

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