Menoufiya University

Faculty of Engineering Shebin El-Kom

Civil Engineering Department

Minufiya University

Diploma Exam 14 / 01 / 2017

Hydraulic structures (CVE552)

Time allowed 3 hrs

Max. Degree : 100

Answer the following questions . Any missing data can be reasonably assumed . Illustrates you answer with neat sketches . answers should be organized , concise and readable.

Question (1) ....(25 MARKS)

A canal crosses a road at right angle ; the canal is allowed to pass through a culvert under the embankment of road .

Canal data :

Bed width = 5.0 m   bed level = (10.50) m ,   Water level = (12.20)m ,
berm level = (12.70) m ,   Bank level = (13.70) m   Discharge = 6 m^3/s

Side slopes from bed to berm = 1:1   from berm to road = 3:2

Road data :   Road width = 10.0 m   road level = (14.2) m   Side slopes 3:2

Soil data : γ_{soil} = 1.65 t/m^3 , and φ_{soil} = 30°

If the heading up shouldn't exceeds 20 cm , and the moving live loads is supposed to be 60 t lorry

It's required to make :

    1- Complete hydraulic design .... (10marks)
    2- Complete structure design ....(10 marks)
    3- Draw R.F.T details of the culvert ....(5 marks)

Question (2) ....(20 MARKS)

A drain passes under amain canal through asteel pipe siphon , maximum discharge is 12 m^3/sec and maximum allowable heading up = 20 cm

Drain data : Bed level = (1.00) ,   Bed Width = 9.0 m ,   Water level = (3.00) m

    Berm Level = (5.25) m,   Side slopes are 3:2 & 2:1,   Bank level (7.0), Bank Width = 6.0 m

Canal data : Bed level = (3.0) m ,   Bed width = 8.0 m ,   Water level = (5.0 m)

    Berm level = (5.25) m, side slope are 3:2 & 2:1 , Bank level (7.5) m   , Bank width = 6.0 m

Soil data : γ_{soil} = 1.6 t/m^3 , φ_{soil} = 30°

It is required to make :

    1- Complete Hydraulic Design ....(15 marks)
    2- Draw half sec. Elevation (upstream side) ....(5 marks)

Question (3) ....**(25 MARKS)**

Design a tail escape for the channel to escape the last reach of length 6 km with velocity 0.45m/sec through 24 hours according to the following data :

Drain data : Bed level = (6.25) m,   Bed Width = 4.0 m,   Water level = (8.00) m

         Berm Level = (10.5) m   Side slopes are 1:1 & 3:2   Bank level (12.3)

Canal data : Bed level = (9.0) m ,   Bed width = 3.0 m   Water level = (10.8m)

         Berm level = (11.5) m   side slope are 1:1 & 3:2   Bank level (12.3) m

Required

  1- Dimension of weir ....(7 marks)
  2- Dimension of orifice ....(7 marks)
  3- Dimension of drainage pipe ....(7 marks)
  4- Draw sec. Elevation..(4 marks)

Question (4) ....**(30 MARKS)**

A reinforced concrete bridge is to be constructed across the canal whose cross section as the following data : -

Bed width = 18.0 m   Bed level = (12.00)   Water surface level = (15.0)

Berm level = (16.0)   Bank level = (18.0)   Berm Width = 3.0 m

Side slope from bed to berm = 1:1 ; side slopes from berm to bank = 2:1 , Land level = (16.0)

the bridge having two vents each of clear span = 8.0 m   , Road width over bridge = 8.0 m

width of footpath = 1.5 m   , roughness coefficient n = 0.025 , slope of water (s) = 8 cm/km

the bridge consists of a slab supported on main beams   , Expected live load is 20 ton lorry and uniform L.L of 500 kg/m2 .

It is required to : -

  1- Complete Hydraulic Design ....(8 marks)
  2- Design the different R.C part of the bridge. ....(15 marks)
  3- Draw R.F.T details of the bridge ....(7 marks)

This exam measures the following ILOs									
Question Number	Q3			Q1	Q2	Q3	Q2	Q3	Q5		
	a 2			b 5	b 6	b 12	C 9	C 11	C 4		
Skills	Knowledge & Understanding Skills			Intellectual Skills			Professional Skills				