

Scheme of Valuation/Answer Key			
(Scheme of evaluation (marks in brackets) and answers of problems/key)			
APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY			
SIXTH SEMESTER B.TECH DEGREE EXAMINATION, MAY 2019			
Course Code: CE 302			
Course Name: DESIGN OF HYDRAULIC STRUCTURES			
Max. Marks: 100		Duration: 4 Hours	
PART A			
<i>Answer any two full questions, each carries 15 marks.</i>			Marks
1	a)	Piping action – 2 marks Uplift – 2 marks	(4)
	b)	Any 5 differences – 5 marks	(5)
	c)	Types with figures – 2 marks for each	(6)
2	a)	Under sluice – 2 marks Silt excluder – 2 marks	(4)
	b)	Classification – 5 types – 1 mark each	(5)
	c)	Design steps – 1 mark each	(6)
3	a)	Figure – 2 marks Components – 3 marks	(5)
	b)	Figure – 1 mark u/s pile Pressure at 3 key points from graph – 1 mark Correction for mutual interference – 1 mark Correction for thickness of floor – 1 mark Final pressure values – 1.5 marks d/s pile Pressure at 3 key points from graph – 1 mark Correction for mutual interference (same value as above) – 1 mark Correction for thickness of floor – 1 mark Final pressure values – 1.5 marks	(10)
PART B			
<i>Answer any one full question, each carries 50 marks.</i>			

4	a)	<p>Suitable type of CDW & Explain why - 1 mark</p> <p>Design of drainage waterway and depth of barrel – 3 marks</p> <p>Design of canal water way – 2 marks</p> <p>Head loss and bed levels at different sections - 4 marks</p> <p>Trough with proper water levels – 2 marks</p> <p>Design of transitions – 2 marks</p> <p>Head loss through syphon barrels – 2 marks</p> <p>Uplift pressure on roof of syphon barrel – 2 marks</p> <p>Uplift pressure on floor of syphon barrel</p> <p>Static head – 2 marks</p> <p>Residual seepage head – 2 marks</p> <p>Total uplift on floor -1 marks</p> <p>Cut-offs and protection works - 2 marks</p>	(25)
	b)	<p>Half sectional plan – half plant at top and half at foundation level: 15 marks (out of which 4 marks for dimensioning and detailing + 1 mark for clarity and neatness of the sketch)</p> <p>Section along the center line of the drain (cross section of aqueduct): 10 marks (out of which 4 marks for dimensioning and detailing + 1 mark for clarity and neatness of the sketch)</p> <p>Note: The credit for drawings shall be given proportional to the design calculations</p> <p>No credit for drawings without design.</p>	(25)
5	a)	<p>Design steps for Sarda type fall:</p> <p>Length of crest: 1 mark</p> <p>Reduced level of crest: 2 marks</p> <p>Profile (shape) of crest: 2 marks</p> <p>Design of cistern (Length & depth of water cushion): 2 marks + 2 marks</p> <p>Upstream and downstream cutoff: 1 mark</p> <p>Maximum seepage head: 1 mark</p> <p>Computation of floor length and proportion (for suitable exit gradient): 3 marks</p> <p>Uplift pressure computation and thickness at critical section: 4 marks</p> <p>U/s protection works(i.e., brick pitching, curtain wall): 3 marks</p>	(25)

		D/s Protection works (i.e., bed, sides and wings with dry brick pitching): 2 marks Friction blocks and cube blocks for energy dissipation: 2 marks	
	b)	Half sectional plan: 15 marks (out of which 4 marks for dimensioning and detailing + 1 mark for clarity and neatness of the sketch) Section: 10 marks (out of which 4 marks for dimensioning and detailing + 1 mark for clarity and neatness of the sketch) Note: The credit for drawings shall be given proportional to the design calculations. No credit for drawings without design.	(25)
PART C			
<i>Answer any two full questions, each carries 10 marks.</i>			
6	a)	Figure – 1 mark Derivation – 3 marks	(4)
	b)	Necessity of no-tension – 1 mark Equation for vertical stress and obtain the condition – 1 mark Middle third rule – 1 mark	(3)
	c)	Equation for limiting height – 1 mark Low dam – explanation with figure – 1 mark High dam – explanation with figure – 1 mark	(3)
7	a)	Two types – 2 marks each	(4)
	b)	Chute spillway – 2 marks Side channel spillway – 2 marks	(4)
	c)	Figure – 1 mark Labelling – 1 mark	(2)
8		Figure – 1 mark Water pressure computation – 1 mark Self-weight computation – 1 mark Uplift pressure computation – 1 mark Overturning moment – 1 mark Resisting moment – 1 mark Factor of safety against overturning – 1 mark	(10)

	<p>Factor of safety against sliding – 1 mark</p> <p>Base pressure distribution diagram – 1 mark</p> <p>State whether safe or not – 1 mark</p> <p>Note : Full credit if the dam may be assumed as masonry or concrete and appropriate density taken</p>	
