### **PART ONE - GATES**

### **GATES - GENERAL**

1 Gates-classification; Operating conditions; Control equipment;

### VERTICAL LIFT GATES

General; Slide gate; Wheel or roller mounted gates; High 2 pressure gates;

### **DESIGN OF VERTICAL LIFT GATES** 27 - 54

General design considerations; Occasional forces; Illustrative 3 design of a bulk head gate

### HOIST

General; Screw lift hoist; Rope drum or chain sprocket hoist; 4 Hydraulic hoist; Automatic hoist with float operation

### **HINGED GATES**

Introduction (radial gates, drum gate, fish belly gate, flap 5 gates); Circular type gates (rolling gate, ring gate, cylindrical gate)

### **RADIAL GATES**

General; Design criteria; Permissible monoaxial stresses for 6 structural components of hydraulic gates; Method of computation of bending stress in flat plates; Design example.

### **RADIAL GATE HOISTS**

7 General; Hoists design considerations & design examples

### **GATE DESIGN - Some Important Considerations** 154 - 164

- Hydraulic forces on vertical lift gates; Vibrations of gates; Air 8 requirements; Weight estimates
- vi **CONTENTS**

### **AUTOMATIC CONTROL OF GATES**

Times and controllers; Open channel distribution system; 9 Central system operation for irrigation; Automatic controls for spillway gates

66 – 74

55 - 65

1 – 7

# 75 - 126

127 - 153

165 - 176

8 - 26

### PART TWO - CONTROL VALVES

### **CONTROL VALVES – General**

177 – 183

**10** Introduction; The Ensign valve; The needle valve; The tube valve; Hollow jet valve; Butterfly valves; The streamlined cylindrical balanced valve; Float type level control valve.

### **BUTTERFLY VALVES**

184 - 200

**11** Types of butterfly valves; Design features; Outline specifications; Controls; Design of mechanical parts; Operation and Maintenance

### INDEX

201 - 202

# INDEX

G

## A

Air requirement	156-160	Gates general	
Automatic control of	f gates	air demand	156-160
central system	170-173	automatic control	165-176
distribution system	n 166-170	classification	1-4
spillway gate	173-176	control equipment	5
timers & controlle	rs 165-166	operating condition	ns 4-5
В			Radial gates)
Bulkhead gate		types	6-7
design	38-54	vertical lift	al Lift Catas)
general	10-11	vibrations	al Lift Gates) 156
Butterfly valves	(See Valves)		160-164
-	(Dee valves)	weight estimates Gate slots	100-104
С		Guard gate	12-13
Caterpillar gate	19-21	H	12-13
Circular gates		High pressure gate	21-23
cylindrical	72-74	Hinged gates	21 23
ring	74-73	drum	66-69
rolling	72	fish belly	66,69-71
Coaster gate	19-21	flap	66, 70,71
Control valves	(See Valves)	radial	00, 70,71
D		design criteria	81-88
Design groundes		design example	88-128
Design examples	120 152	design	76-81
hoists	129-153 88 - 128	Hoists	
radial gate	88 - 128 38-54	automatic 50,62	2,65,165-176
vertical lift gate	38-34	chain sprocket	55-56
E		hydraulic	56,62-64
Emergency gate	12-13	radial gate	57,127-129
Ensign valve	177-178	design example	129-153
-	177 170	rope drum	56,58-62
$\mathbf{F}$		screw type	56,57
Fish belly gate	66,69-71	weight	163
Fixed wheel gate	16-18	Hollow jet valve	179-180
Flap gate	66,70,72	J	
Float valve	182-183	Jet flow gate	25-26
		Jot now guie	

L		hollow jet	179-180
Lip (gate) shapes	13-14	needle	178-179
Μ		tube Vortical lift actor	179
		Vertical lift gates bulkhead	10-11
Manual operation (valve) 189		caterpillar	10-11
Ν		coaster	19-21 19-21
Needle valve	178-179	design consideration	27-38
		design example	38-54
O Operation & maintenance		emergency	12-13
(Valves)	199-200	fixed wheel	16-18
× /	199-200	gate slot	10 10
R		guard	12-13
Radial gate		high pressure	21-33
control system	173-176	hydraulic forces	152
design criteria	81-88	jet flow	25-26
design example	88-128	lip shapes	13-14
e	87,127-129	ring follower	23
hoist	56,58-62	ring seal	23-24
hoist design	129-153	roller mounted	15
hoist weight	163	regulating	13
weight	163	slide	8-9
Regulating gate	12 23	Stoney	18-19
Ring follower gate Ring seal gate	23-24	wheel	15
Roller mounted gate	15	W	
e		Weight of gates	
S		flap	164
Slide gate	8-9	fixed wheel	160-162
Stop log gates	10,162	jet flow	162
Stoney gates	18-19	radial	163
Τ		ring follower	162
Tainter gate (see R	adial gate)	ring seal	162
Tube valve	179	rolling	164
V		stop log	162
Valves		tainter	163
	81,184-200		
controls 189-192			
design features 186-188			
design of mech. parts 192-194			
operation & mainte			
1	199-200		
types	184-186		
control	177		
cylindrical	181		
Ensign	177-178		
float type	182-183		