Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058.

Even Sem- END SEMESTER RE-EXAMINATION

Program: T.Y.B.Tech (Civil)
Course code: BTC327
Course Name: Design and Drawing of Steel Structures

Date:
Duration: 3 hours
Max Marks: 100

Sem VI

Instructions:
Q1. is **compulsory**
Attempt any **FOUR** questions out of remaining six questions
Figures to the right indicate full marks.
Assume suitable data if necessary and state the same clearly
Use of **IS800-2007** and **steel tables** is permitted in the examination

Q. No		Maximum Marks	Course Outcome Number	Module Number
1)	a. List some important advantages of Limit State over Working stress method b. Explain with sketch neutral, stabilizing & destabilizing loads in case of beam & how it affects its design c. List with sketches different types of defects found in welding d. List all the geometrical properties of steel sections & explain their signification (5 marks each)	20	1 & 2	1,4,5,6
2)	a. Design a single angle to carry a compression of 120 kN & having length 2.5 m. Yield & ultimate strengths are 250 & 410 MPA. (10) b. Design the BOLTED seat angle connection between the beam ISMB250 and column ISHB200 for a factored reaction from beam equal to 110 kN. Use M20 bolts of 4.6 grade and steel 410 with fy = 250 MPa (10)	20	1	3,6
3)	a. Design a single angle to carry a tension of 150 kN. Use M20 bolts for end connections having class 4.6. Yield & ultimate strengths are 250 & 410 MPA (10)	20	1	2,6

	b. Design the welded seat angle connection between the beam ISMB300 and column ISHB250 for a reaction from beam equal to 120 kN. Use M16 bolts of 4.6 grade and steel 410 with fy = 250 MPa (10)			
4)	Design laced column with channels back to back to working load of 1000 kN. Unsupported length is 9 m with one end fixed & one pinned. Assume welded connection FOR LACING.	20	1	3
5)	a. Design a suitable I beam for a simply supported span of 5 m. and carrying UDL of 20 KN/m. Take fy = 250 MPa. Assuming it is restrained laterally, having stiff bearing. (10) b. A beam ISMB500 transfers a working load of 350 kN to a column ISHB450. Using Fe410 grade steel design the stiffened seat connection with bolting (10)	20	1	5,6
6)	Design a welded Gusseted base for a column ISHB200 having working load of 1000kN, yield strength 250 MPA & use M25 grade of concrete	20	1	4
7)	a. Calculate moment carrying capacity of a laterally unsupported beam ISMB300 having length 5 m. (10) b. Design the BOLTED cleat angle connection between the beam ISMB200 and column ISHB200 for a factored reaction from beam equal to 65 kN. (10)	20	1	5,6

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END SEM-EXAMINATION

May 2018

Program: Civil Engineering

B. Tech. Third Year **Duration: 3 hr**

Course code: BTC326 **Maximum Marks: 100**

Name of the Course: Geotechnical Engineering-II

Semester: V

Instructions:

1. **Question No 1 is compulsory**
2. **Out of Question 2 to Question 7 attempt any 4 questions.**
3. Neat diagrams must be drawn wherever necessary.
4. Assume Suitable data if necessary and state it clearly

Que. No.		Max. Marks	Course Outcome Number	Module No.
Q1(a)	A retaining wall, 6 m high, retains dry sand with an angle of friction of 30° and unit weight of 16.2kN/m^3. Determine the earth pressure at rest. If water table rises to the top of the wall, determine the increase in the thrust on the wall. Assume submerged unit weight of sand as 10kN/m^3	6	CO2	1
(b)	Brief about the classification of underground Conduits.	4		5
(c)	Discuss Rankine's analysis for minimum depth of foundation.	6	CO2	3
(d)	Discuss negative skin friction in case of pile foundation.	4	CO1	3
Q2(a)	A wall, 5.4 m high, retains sand. In the loose state the sand has void ratio of 0.63 and ϕ= 27° while in the dense state, the corresponding values of void ratio and ϕ are 0.36 and 45° Respectively. Compare the ration of active and passive earth pressure in the two cases assuming G= 2.64	7	CO1	1
(b)	Discuss stability consideration of gravity retaining wall.	7	CO1	2
(c)	Discuss applications of reinforced earth in civil Engineering.	6	CO2	7
Q3(a)	A 3 m square footing is located in a dense sand at a depth of 2.0 m Determine the ultimate bearing capacity for the following water table position (i) At ground surface (ii) At footing level (iii) At 1 m below the footing The moist unit weight of sand above the water table is 18kN/m^3 and saturated weight is 20kN/m^3. ϕ= 35°; c=0; N_q=33 and N_γ=34.0	7	CO2	3

(b)	Discuss how geotextiles are different from geosynthetic	5	CO1	7
(c)	A pile is driven with a single acting steam hammer of weight of 15kN with a free fall of 900 mm. the final set, the average of the last three blows, is 27.5 mm. find the safe load using Engineering News formula.	4	CO2	4
(d)	Brief the classification of underground conduits	4		5
Q4(a)	Discuss the pile load test as per IS 2911	10	CO1	4
(b)	Differentiate rigid and flexible retaining structure	4	CO2	1&2
(c)	Compute the ultimate bearing capacity of a circular footing of 1 m diameter resting on the surface of a saturated clay of unconfined compressive strength of 100 kN/m^2. Calculate safe value if FOS is 3.	6	CO1	3
Q5(a)	A group of 9 piles arranged in a square pattern with diameter and length of each pile as 25 cm and 10m respectively, is used as a foundation in soft clay deposit. Taking the unconfined compressive strength of clay as 120kN/m2 and the pile spacing as 100cm centre to centre. Find the load capacity of the group. Assume the bearing capacity factor N_c=9 and adhesion factor is 0.75. FOS=2.5	8	CO2	4
(b)	Discuss imperfect ditch conduit	6	CO3	5
(c)	Discuss Coulomb's wedge theory	6	CO2	1
Q6(a)	Discuss dynamic formulae along with limitations	8	CO3	4
(b)	Draw pressure distribution diagram for cantilever sheet pile in granular soil	6	CO3	6
(c)	Discuss in detail pile driving	6	CO3	7
Q7(a)	A plate load test was conducted in a sandy soil with a plate of size 0.3m x 0.3 m. the ultimate load per unit area was found to be 2.0 kg/cm2. Find the allowable load for a footing of 2mx 2m. FOS =3	4	CO3	4
(b)	Explain the procedure for estimating active eart pressure by Culmann's graphical method	8	CO2	1
(c)	Discuss I S code method for computing bearing capacity of soil	8		3

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Re Examination June - 2018

Max. Marks:100 **Duration: 3 hours**
Class: T. Y. B. Tech. **Semester: VI** **Program: Civil**
Name of the Course: Transportation Engineering - II **Course Code : BTC-329**

1. **Question No 1 is compulsory.**
2. **Attempt any four questions out of remaining six.**
3. **Draw neat diagrams**
4. **Assume suitable data if necessary**

Que. No		Marks
Q1	**write short notes on (Solve any Four)**	
(a)	subsurface drainage system	20
(b)	Explain origin and destination study.	
(c)	Abutment with and without wing wall	
(d)	Grade separated intersection.	
(e)	Mud Pumping in Rigid Pavement.	
Q2		
(a)	Discuss the term overturning and Lateral Skidding	06
(b)	Discuss the desirable Properties of Subgrade soils	06
(c)	Discuss the different survey to be carried out for locating new highway.	08
Q.3		
(a)	Enlists the different test to be carried out on Road aggregate. Explain with neat sketch any two of them in detail.	10
(b)	What is Transition curve? Why it is provided. How you will calculate the length of transition curve.	10
Q.4.		
(a)	Explain and compare in detail flexible and rigid pavement with example.	07
(b)	Derive an expression for finding the extra widening required on horizontal curve. Also, explain how widening of pavement introduced in field.	07
(c)	Discuss revised PRA system for classification of subgrade soil.	06

Q.5.		
(a)	Discuss importance of Afflux and Scouring in bridge construction	07
(b)	A bridge has a linear waterway of 150 m across a stream whose natural waterway of 220 m. If the average flood discharge is 1200 m^3/ sec, average flood depth is 3 m. calculate afflux under the bridge.	07
(c)	What is the factors to be consider while selecting the site for bridge.	06
Q.6.		
(a)	Discuss the Term (a) Linear Waterway, (b) Afflux, (c) Scouring	09
(b)	Derive the Expression used for economic span of bridge. Also, state the assumption made.	06
(c)	The bridge is proposed across a stream carries a discharge of 270 m^3/sec. determine the maximum Scouring depth for single span of 45 m. (Assume silt factor = 1)	05
Q.7.		
(a)	Explain with aid of neat sketches the method of eliminating camber and introduction of super elevation on curve portion of road.	07
(b)	Write short notes on application of geotextile and geogrid in highway pavements.	07
(c)	Write short notes on Passenger Car Unit.	06

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END SEMESTER EXAMINATION

May2018

Program: T.Y.B.Tech (Civil) **Date: 25-05-2018**

Course code: BTC331 **Duration:3 hours**

Course Name: Theory of Reinforced and Prestressed Concrete

Maximum Marks: 100 **Semester: VI**

Instructions:

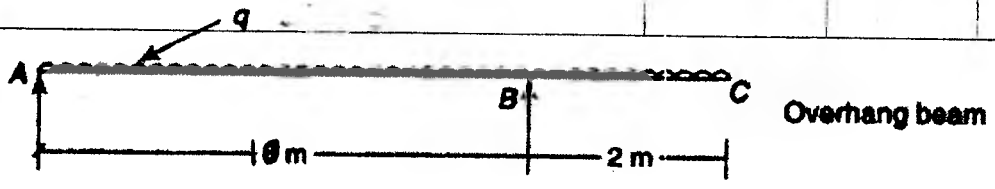
Attempt **any five** main questions
Figures to the right indicate full marks.
Assume suitable data wherever required and state it clearly.
Use of **IS:456-2000 is permitted in exam**

Question No.		Maximum Marks	Course Outcome Number	Module No.
Q1.				
a)	What is a doubly reinforced beam? State the conditions under which construction of such beams is adopted.	**05**	**01**	**02**
	OR			
b)	What is Development Length? Explain its significance. Derive the expression for L_d	**05**	**01**	**02**
c)	What are the different losses encountered while prestressing a member? Differentiate between Pre-tensioned and Post-tensioned method (5 points).	**06**	**02**	**04 & 05**
d)	Design an RC column to carry an axial load of 1500 kN. The size of the column is restricted to 600mm. The effective height of the column is 8m. Use $\sigma_{cc} = 6N/mm^2$ and $\sigma_{sc} = 190N/mm^2$.	**09**	**01**	**03**
Q2.				
a)	Design an interior slab panel simply supported to cover a room of internal dimensions 4.2m x 5.2 m by IS Code Coefficient Method. Assume live load acting on the slab as $4kN/m^2$; floor finish load as 1 kN/m^2. Assume that the slab corners are prevented from lifting up. Show details of bottom reinforcement and torsional reinforcement.	**20**	**01**	**03**

Q3.				
a)	An isolated RC T-beam has the following dimensions: i) Flange width = 2750 mm ii) Width of rib = 300 mm iii) Depth of rib = 800 mm iv) Depth of flange = 120mm v) Steel provided = 6-25 mm diameter vi) Span = 7.5m Concrete M20 and steel Fe415 is used. Find the safe udl the beam can carry.	10	01	02
b)	Design vertical stirrups for a simply supported beam of cross section 300mm x 650mm effective. The maximum shear force experienced by the section is 230 kN and it is reinforced with 6 bars of 20mm Φ of Fe415 steel. Use M20 grade of concrete.	10	01	02
Q4.				
a)	A post tensioned concrete beam of section 200 mm x 450mm is used over an effective span of 6.5 m to support a udl of 5 kN/m which includes the self-weight of the beam. The beam is prestressed by a straight cable carrying a force of 250 kN located at an eccentricity of 75mm at the centre of the span. Determine the location of the thrust line in the beam and plot its position at quarter and central span sections.	10	02	05 & 06
b)	An unsymmetrical I-section beam is used to support an imposed load of 6kN/m over a span of 10m. The cross sectional details are as follows: Top flange = 650mm wide and 80mm thick Thickness of web = 80mm Bottom flange = 250mm wide and 60 mm thick. Overall depth of the beam is 500 mm. At the centre of span, effective prestressing force of 400 kN is located at 50mm from the soffit of the beam. Determine the stresses at the centre span section of the beam for the following conditions: i)Prestress + Self-weight ii) Prestress + Self-weight + Live load.	10	02	05
Q5.				
a)	What is Reinforced Concrete? What are its advantages over Plain Cement Concrete? (3 pts) State the assumptions made in working stress method of design. (3 points)	06	01	01
b)	An RC beam 230 mm x 550 mm overall is reinforced with 4 bars of 25mm diameter on the	14	01	02

	tension side. i) Findhe moment of resistance of this beam section. Use M20 grade concrete and Fe415 steel. ii) Also if the moment of resistance calculated above in (i) is increased by 50% and the dimensions of beam are kept the same, **design the beam**.			
Q6.				
a)	A prestressed concrete beam, 200mm wide and 300 mm deep is prestressed with wires of area = 320mm^2, located at an eccentricity of 50mm and carrying an initial stress of 1000 N/mm^2. The span of the beam is 10 m. Calculate the percentage loss of stress in wires if: i)The beam is Pre-tensioned & ii) The beam is Post-tensioned. Use the following data: E_s= 210 kN/mm^2, E_c = 35 kN/mm^2 Relaxation of steel stress = 6% of the initial stress Residual shrinkage strain = 300 x 10^{-6} (Pretensioning) = 200 x 10^{-6} (Post-tensioning) Creep coefficient = 1.6 Slip at anchorage = 1.2 mm Frictional coefficient for wave effect (k) = 0.0015/m	**15**	**02**	**05**
b)	Why high strength materials are used for prestressed concrete?	**05**	**02**	**04**
	OR			
c)	A prestressed concrete beam of I-section has top flange of 1500 x 300 mm, bottom flange 750 x 200 mm, web is 180 mm wide, overall depth is 2500 mm. Determine the efficiency of the section.	**05**	**02**	**06**
Q7.				
a)	A prestressed concrete beam of uniform rectangular cross-section and span 18 m supports a total distributed load of 300 kN excluding the weight of the beam. Determine the suitable dimensions of the beam and calculate the area of the tendons and their position. The permissible stresses are 14 N/mm^2 for concrete and 1050 N/mm^2 for the tendons.	**08**	**02**	**07**
b)	Design one way slab of span 4 m subjected to a live load of 4 kN/m2 and floor finish 1.5 kN/m2. Draw the sketch showing reinforcement details.	**12**	**01**	**03**
	OR			
c)	A concrete beam with a single overhang is simply supported at A and B over a span of 10 m and the	**12**	**01**	**03**

	overhang BC is 2m. The beam is of rectangular section 350 mm wide by 950 mm deep and supports a uniformly distributed live load of 4 kN/m over the entire length in addition to its self-weight. Determine the profile of the prestressing cable with an effective force of 550 kN which can balance the dead and live loads on the beam. Sketch the profile of the cable along the length of the beam.			



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Munshi Nagar, Andheri (West), Mumbai 400058.

End Semester Exam (main- Examination)
May - 2018

Max. Marks:100 **Duration: 3 hours**
Class: T. Y. B. Tech. **Semester: VI** **Program: Civil**
Name of the Course: Transportation Engineering - II **Course Code : BTC-329**

1. **Question No 1 is compulsory.**
2. **Attempt any four questions out of remaining six.**
3. **Draw neat diagrams**
4. **Assume suitable data if necessary**

Que. No		Marks	CO
Q1	**write short notes on (Solve any Four)**	20	1,2,3 ,5
(a)	Third Twenty Years Road Development Plan		
(b)	Types of Gradients and Recommended values by IRC		
(c)	Factors affecting alignment of road		
(d)	Vehicle Damage Factor		
(e)	Application of Geotextile and Geogrid in Highway Pavements		
Q2			
(a)	While aligning a National highway in a built up area it was necessary to provide a circular curve of radius 350 m. design following feature. (a) Superelevation (b) Extra widening (c) length of transition curve.	10	2
(b)	Define the term WBM. How will you construct WBM type subbase and Base of Flexible Pavement? Also, state the suitability of aggregate for construction of these layers as per IRC specifications.	10	4
Q.3			
(a)	Derive the expression for overtaking sight distance. Give the recommended value of overtaking sight distance for different speed of vehicle.	10	2
(b)	Calculate the safe stopping sight distance for a design speed of 100 km/hr on ascending gradient of 1:40 %. Assume the necessary data if required.	10	2
Q.4.			
(a)	Discuss the design of surface drainage system	10	5
(b)	Design a pavement section by triaxial method using following data: Wheel load = 4100 Kg, Radius of contact area = 15 cm, traffic coefficient = 1.5, rainfall coefficient = 0.9, design deflection = 0.25 cm, E- Value for subgrade = 60 kg/cm^2, E- value for base = 225 kg/cm^2, assume 7.5 cm thickness bituminous	10	3

	layer to be provided at the top of base course having E- value 1100 kg/cm^2. Also, draw a section of Pavement		
Q.5.			
(a)	The Plate Bearing test is conducted with 30 cm size plate on subgrade, it sustained a load of 1500 kg at 0.25 cm deflection. When the test was carried out on base course of thickness 15 cm sustain a load of 5500 kg at 0.25 cm deflection. Design a pavement for wheel load of 7000 kg and tyre pressure of 6.5 kg/cm^2 using Burmister Approach. If 6.0 cm thickness bituminous layer provided at the top of base course having E- value 2100 kg/cm^2 Design a section of Pavement.	10	3
(b)	Discuss IRC approach for conducting the Benkelman Beam study at site	10	5
Q.6.			
(a)	How will you conduct spot speed study by manual method? Also, discuss procedure for analysis of data collected for deciding the speeds.	10	6
(b)	Calculate the stress at interior, edge and corner region of cement concrete slab using Westargard stress equation, stress in edge and corner region using modified Westargard stress equation Wheel load = 5100 Kg., E- Value = 3 * 10^5, Pavement Thickness = 20 cm, Poisson's Ratio = 0.15, Modulus of subgrade reaction = 6 kg/cm^3, Radius of contact area = 15 cm. Also, calculate the warping stress at interior, edge corner region of cement concrete slab and frictional stress using following data. Maximum difference of temperature between top and bottom of the slab during summer = 10^0 C. The Length of Slab = L_x = 4.5 m, The Width of Slab = L_y = 3.5 m, the coefficient of thermal expansion of cement concrete = 10 * 10^{-6}, the friction factor, f = 1.5	10	3
Q.7	**write short notes on (Solve any Four)**	20	
(a)	Bituminous Surface Dressing		5
(b)	Determination of Design Discharge by Area – Velocity Method		5
(c)	Preparation of subgrade		4
(d)	Temperature stress		3
(e)	Different types of joint in rigid pavements		3

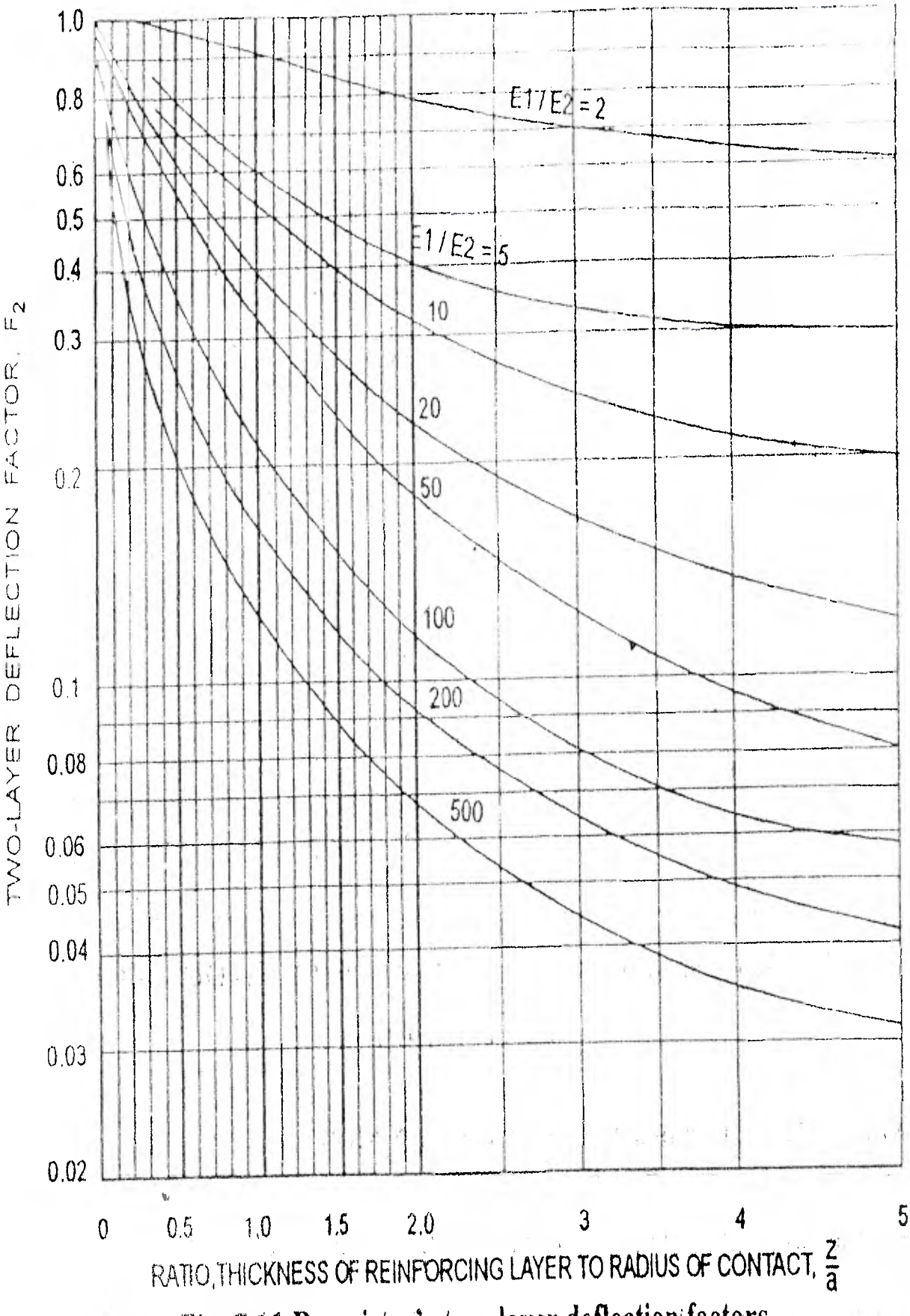

Fig. 7.11 Burmister's two-layer deflection factors

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Re-Examinations

June 2018

Max. Marks: **100** Duration: **03 Hours**

Class: **T.Y. B.Tech. Semester: VI** Program: **U.G. Civil Engineering**

Name of the Course: ***Hydraulic Engineering-II*** Course Code : BTC328

Instructions:

1. Attempt ***Any Five*** questions
2. All questions carry equal marks
3. Answer to each question to be started on the fresh page
4. Assume suitable data if necessary and mention it clearly.
5. Draw neat diagrams.

Question No.		Maximum Marks	Course Outcome Number	Module No.
Q1	(a) Explain: Hydro-dynamically smooth and rough boundaries and discuss Prandtl's Mixing length theory.	(10)	CO1	01
	(b) A rough pipe of diameter 30 cm and length 1.20 km carries water at the rate of 0.45 m^3/sec. The wall roughness is 0.010mm. Determine the coefficient of friction, wall shear stress and velocity at a distance of 10 cm from the pipe wall.	(10)	CO1	01
Q2	(a) Derive: Von-Karman momentum integral equation Explain the term used.	(10)	CO1	02
	(b) For a velocity distribution $(u/U_o) = 2.(Y/\delta) - (Y/\delta)^2$. Determine boundary shear stress and drag force.	(10)	CO1	02
Q3	(a) Explain: Circulation and Magnus effect in submerged body and also discuss stagnation point around a rotating cylinder.	(10)	CO4	03
	(b) Explain; streamlined body, bluff body and singing of telephone cables.	(10)	CO4	03
Q4	(a) What do you understand by hydraulically efficient channel? Derive an expression for hydraulically efficient trapezoidal channel.	(10)	CO2	04
	(b) For a discharge of 20 cum./sec. of water, bed slope of channel is 1 in 1550 and Manning's roughness constant = 0.018. Design the most economical trapezoidal channel section. Take side slope as 1H:1V.	(10)	CO2	04
Q5	(a) Explain with neat sketches venturiflume and standing wave flume.	(10)	CO3	05
	(b) Explain backwater and drawdown curves in channel flow. Also explain with neat sketches flow profiles in case of steep sloped channel.	(10)	CO3	06

Q6	(a)Explain: Critical, normal, conjugate and alternate depths in the channel flow. Also discuss the formation of hydraulic jump in the channel	(10)	CO3	06
	(b) Determine the length of back water curve by an afflux of 2.50 m in rectangular channel of width 50 m. and depth 3 m. The slope bed is 1 in 12500. Take Manning's constant N = 0.03.	(10)	CO3	06
Q7	(a)Explain significance of primary or fundamental quantities and derived or secondary quantities in dimensional analysis. Also discuss scale effects, distorted and undistorted model.	(10)	CO5	07
	(b)The resisting force 'R' of a supersonic plane during flight can be considered as dependent upon the length of the aircraft 'L', velocity 'v', air viscosity 'μ', air density 'ρ', and bulk modulus ' k'. Express the functional relationship between these variables and resisting force.	(10)	CO5	07

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END SEMESTER EXAMINATION May 2018

Program: T.Y.B.Tech (Civil) Date: 16-05-2018
Course code: BTC327 Duration: 3 hours
Course Name: Design and Drawing of Steel Structures Max Marks: 100

Instructions:
Q1. is **compulsory**
Attempt any **FOUR**questions out of remaining six questions
Figures to the right indicate full marks.
Assume suitable data if necessary and state the same clearly
Use of **IS800-2007** and **steel tables** is permitted in the examination

Question No		Maximum Marks	Course Outcome Number	Module Number
1)	a. List some important advantages of steel construction over RCC construction b. Specify & explain the reasons for complex behavior of connection c. Explain two buckling failure with a sketch. Specify parameters affecting the same d. List all the parameters affecting beam strength e. List different components of roof truss system. Mention all the primary loads, load combinations & load transfer mechanism (4 marks each)	20	1& 2	1,4,5,6,7
2)	a. Design a single angle to carry a tension of 90 kN. Use M20 bolts for end connections having class 4.6. Yield & ultimate strengths are 250 & 410 MPA. (10) b. Design the stiffened seat angle connection between the beam ISMB350 and column ISHB300 for a factored reaction from beam equal to 240 kN. Use M20 bolts of 4.6 grade and steel 410 with fy = 250 MPa (10)	20	1	2,6
3)	a. Find the compressive strength of ISHB200 having a top and bottom cover plate of 400x20. The unsupported length is 5 m. one end is fixed & other hinged about y axis & both end fixed about z axis (10) b. Design the bolted seat angle connection between the beam ISMB300 and column ISHB250 for a factored reaction from beam equal to 120 kN. Use M16 bolts of 4.6 grade and steel 410 with fy = 250 MPa (10)	20	1	3,6
4)	Design Battened column with channels back to back to working load of 1100 kN. Unsupported length is 8 m with one end fixed & one pinned. Assume welded connection.	20	1	3
5)	a. Design a suitable I beam for a simply supported span of 7 m. and carrying a point load of 200kN at mid span. Take fy = 250 MPa. Assuming it is restrained laterally, having stiff bearing. (10) b. A beam ISMB500 transfers a factored load of 300 kN to a column ISHB450. Using Fe410 grade steel design the stiffened seat connection with welding (10)	20	1	5,6
6)	Design a Gusseted base for a column ISMB400 having working load of 1000kN, yield strength 250 MPA & use M30 grade of concrete	20	1	4
7)	a. Calculate moment carrying capacity of a laterally unsupported beam ISMB400 having length 4 m. (10) b. Design the welded cleat angle connection between the beam ISMB200 and column ISHB200 for a factored reaction from beam equal to 65 kN. (10)	20	1	5,6

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End Semester Examinations
May 2018

Max. Marks: **100**
Class: **T.Y. B.Tech. Semester: VI**
Name of the Course: ***Hydraulic Engineering-II***

Duration: **03 Hours**
Program: **Civil Engineering**
Course Code : **BTC328**

Instructions:

1. Attempt ***Any Five*** questions
2. All questions carry equal marks
3. Answer to each question to be started on the fresh page
4. Assume suitable data if necessary and mention it clearly.
5. Draw neat diagrams.

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Question No.		Maximum Marks	Course Outcome Number	Module No.
Q1	(a) Explain causes of turbulence, instability mechanism of turbulence, Reynolds stresses, semi-empirical theories of turbulence in case of a pipe flow.	(10)	CO1	01
	(b) Derive Prandtl's universal velocity distribution equation for turbulent flow through circular pipes.	(10)	CO1	01
Q2	(a) Obtain Von-Karman's momentum integral equation and also explain growth of boundary layer over a curved plate, velocity distributions, pressure variation and point of separation.	(08)	CO1	02
	(b) For a velocity profile of $u/U = 2(y/\delta) - 2(y/\delta)^3+2(y/\delta)^4$ Estimate: (i) Boundary layer thickness; (ii) Momentum thickness; (iii) Energy thickness (iv) Displacement thickness; (v) Shear stress;	(12)	CO1	02
Q3	(a) What is Magnus effect? Explain the phenomenon in detail.	(06)	CO4	03
	(b) Differentiate between streamlined bodies and bluff bodies.	(06)	CO4	03
	(c) A kite weighing 6 N of an effective area of 0.85 m^2 is maintained in the air at an angle of 12^0 to the horizontal. The string attached to the kite makes an angle of 45^0 to the horizontal and at this position the coefficient of drag and lift are 0.62 and 0.76 respectively. Find the speed of the wind and the tension in the string. Take the density of air as 1.25 kg/m^3.	(08)	CO4	03

09/10

Q4	(a) What is most economical channel section? Discuss prismatic and non-prismatic channels and derive the conditions for most economical triangular channel section.	(10)	CO2	0
	(b) Explain: Specific energy Curve and Specific force curve and prove that in a rectangular channel, for a critical state of flow: $V/\sqrt{g.y} = 1$, where V = velocity of flow, g = acceleration due to gravity and y= depth of flow in the channel.	(10)	CO2	0
Q5	(a) Classify: flow in open channel.	(05)	CO2	0
	(b) Explain with neat sketch working of Venturiflume.	(05)	CO2	0
	(c) Derive an expression for discharge through a channel by Chezy's formula and also find the relationship between Chezy's (C) and manning's (N).	(05)	CO2	0
	(d) A rectangular channel 2.25 m wide carries a discharge of 7.50 m^3/s. Calculate the critical depth and specific energy at critical depth.	(05)	CO2	0
Q6	(a) Derive dynamic equation for gradually varied flow in case of a wide rectangular channel and explain the flow profiles M1, M2, and M3 in mild sloped channel.	(10)	CO3	0
	(b) Determine the length of back water curve caused by an afflux of 1.5 m in a rectangular channel width 60 m and depth 2.0 m The longitudinal slope of the bed is given as 1 in 2000. Take Manning's N = 0.03.	(10)	CO3	0
Q7	(a) What are the various methods of dimensional analysis to obtain the functional relationship between various parameters affecting a physical phenomenon? Describe anyone with an example.	(10)	CO5	0
	(b) What is model prototype relationship? Discuss the importance of laws of similarity, geometric, kinematic and dynamic similarities used in dimensional analysis.	(10)	CO5	0

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Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)

Munshi Nagar, Andheri (West), Mumbai – 400058.

End Semester Examination, May- 2018

Q. P. Code:

Max. Marks: 100 Duration: 3 hour

Class: T.Y.B.Tech. Semester: VI Program: Civil

Name of the Course: Environmental Engineering-I Course Code : **BTC- 330**

Instructions:

1. Question No 1 is compulsory.
2. Attempt any four questions out of remaining six.
3. Draw neat diagrams
4. Assume suitable data if necessary

Question No. 1 (solve any four from **a to f**)		Maximum Marks	C.O.	Mod.
Q1	(a) Explain Carbon cycle with neat sketch.	**05**	C.O.4	1
	(b) Explain Soil Pollution & Its Causes.	**05**	C.O.1,4	2
	(c) Discuss the sources of thermal pollution	**05**	C.O.1,4	3
	(d) Highlight the significance of weir loading in settling tank design.	**05**	C.O.3	5
	(e) Explain in the mechanism of disinfection process.	**05**	C.O.3	4
	(f) What is a leachate? What are its effects on ground water?	**05**	C.O.4	7
Q2	**(a)** The population data of a town are given below:	**06**	C.O.2	4
	Estimate the expected population in the year by 2050 by Incremental increase and Geometric Increase method.			
	(b) What is meant by per capita demand? Explain various factors that affect the per capita demand.	**08**	C.O.2	4
	(c) Explain the concept of ecology & ecosystem with its components.	**06**	C.O.4	1
Q3	**(a)** Design a circular sedimentation tank to treat 10 MLD of water from the following data: Depth of Liquid = 3.5 m, Detention time = 4hr.	**06**	C.O.3	5
	(b) What is meant by design period? Discuss the factors affecting design period.	**06**	C.O.2	4
	(c) Explain the Indore & Banglore method of composting.	**08**	C.O.4	7

Year	1990	2000	2010	2020	2030
Population	90000	120000	160000	250000	272000

Q4	**(a)** Design a rapid sand filter with under drainage system to treat 10 MLD of raw water per day allowing 0.5% of filtered water for backwashing. Assume necessary data. **(b)** Explain the various factors considered in the selection of a site for a sanitary landfill.	**10** **10**	C.O.3 C.O.4	5 7
Q5	**(a)** Design a paddle flocculator for 15 MLD plant with following details: • Detention period = 20 minutes • Average value of G = 40 s^{-1} • speed of paddles = 4.5 rpm • velocity ratio= 0.25 • density of water = 998 kg/m^3 at 20^0C • absolute viscosity = 1.0087 x 10^{-3} N. s/m^2, at 20^0C • Ratio of length to width = 2 **(b)** With the help of neat sketch, explain the working of rapid sand filter.	**10** **10**	C.O.3 C.O.3	5 5
Q6	**(a)** Write short note on removal of color and odour. **(b)** Compare slow sand filters with Rapid sand filters. **(c)** Explain briefly the following processes: i) Break point chlorination ii) Super chlorination	**04** **08** **08**	C.O.4 C.O.3 C.O.3	6 5 5
Q7	**(a)** Explain in brief types of aerators. **(b)** Suggest suitable measures to prevent the noise pollution. **(c)** Discuss the factors to be considered in selecting suitable site for the Intake structures. **(d)** Describe the chemical reactions involved during coagulation and indicate the formula for the floc formation.	**05** **05** **05** **05**	C.O.3 C.O.1,4 C.O.2 C.O.3	6 2 4 5