

BANGLADESH SWEDEN POLYTECHNIC INSTITUTE, KAPTAI  
SEMESTER PLAN FOR THEORETICAL CONTENT

TECHNOLOGY: CONSTRUCTION

Subject Name: Design of Structure - I (66463)

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Week No.	Content No.	Lesson No.	Class/ Quiz Test	Brief Description of Content
01	1.1-1.2	1		Describe the plain concrete, reinforced concrete and prestressed concrete. Describe the different uses of the plain concrete, reinforced concrete and prestressed concrete.
	1.3-1.5	2		Mention the advantages, disadvantages & limitations of the plain concrete., Mention the advantages, disadvantages & limitations of the reinforced concrete., Mention the advantages, disadvantages & limitations of the prestressed concrete.
	2.1-2.3	3		Explain the need for structural safety, Solve simple problems using the design codes. Explain the necessity for safety provision.
02	3.1-3.3	1		Define the meaning of load. Classify different kinds of loads. Define Richter scale, tectonic plate and epicenter.
	3.4-3.5	2		Explain the necessity of considering the seismic load and wind load in designing reinforced concrete works., Mention the significant of the thrust (like tidal, cyclones etc.) to be consider in designing reinforced concrete structure in coastal zone.
	4.1-4.5	3		State the meaning of stress, strain, ultimate stress and allowable stress of concrete. Define young modulus of elasticity of concrete. Calculate young modulus of elasticity of concrete. Interpret stress-strain curve of steel and concrete. Mention the purpose of compression test of concrete.
03	4.6-4.9	1		State the different size & shape of moulds for compression test., Describe test procedure of crushing cubes and cylinders for compression test., Determine ultimate stress of concrete ( $f'_c$ ) and allowable stress of concrete ( $f_c$ )., Determine the allowable shear stress of concrete using ultimate stress of concrete.
	5.1-5.6	2		List the different types & grades of steel used in RCC and prestressed concrete., Mention the advantages of uses of mild steel in RCC., Describe the scope of using welded wire fabric in RCC., Mention the characteristics of plain bar, deformed bar and twisted bar and tendon., Mention the advantages of uses of deformed and twisted bar in RCC., State the minimum reinforcement used in RCC beam and slab.
	6.1-6.3	3	CT-1	Define resisting moment. Explain the stress diagram of a loaded beam., Identify compression and tension zones of a homogenous beam.
04	6.4-6.5	1		Express the derivation of the flexure formula for homogeneous beam., Solve the problems on homogeneous rectangular beam.
	7.1-7.3	2		Define transformed section. Explain the theory of transformed section with sketches. Express the derivation of the equation for investigating the stresses developed in concrete and steel by transformed section method.
	7.4-7.6	3		Calculate the stresses developed in rectangular beam and T-beam in WSD method. Explain balanced reinforced beam, under reinforced beam and over reinforced beam. Mention the effect of under reinforcement and over reinforcement in RCC beams.
05	8.1-8.3	1		State the assumptions used in developing the flexure formula. Explain the stress diagram of a loaded RCC beam. Mention the notations used in flexure formula in WSD method.
	8.4-8.5	2		Express the derivation of the flexure formula for RCC beam in WSD method. Solve problems of flexure formula based on WSD method.
	9.1-9.4	3		Explain the effects of shear force and stress in RCC beams. State the meaning of diagonal tension. Explain the causes of creating diagonal tension in RCC beams. Express the derivation of the formula to determine shear stress developed in RCC beams.
06	9.5-9.7	1		Solve the problems on shear stress developed in WSD method. Solve the problems on shear stress developed in USD method. Mention the allowable shear stress for RCC beam ( $v$ ) and shear stress for concrete ( $v_c$ ).
	10.1-10.4	2		Define web reinforcement. Classify web reinforcement with sketches. Mention the functions of web reinforcement in RCC beams. Determine

				the spacing of web reinforcement (vertical & inclined) in WSD method.
	10.5-10.6	3	Q-1	Determine the spacing of web reinforcement in USD method. Determine the portion of the RCC beam requiring web reinforcement.
07	11.1-11.2	1		State the meaning of bond stress. Express the derivation of the formula to determine bond stress developed in RCC beams.
	11.3-11.5	2		State the allowable bond stress for plain bar and deformed bar in WSD and USD methods. Determine the anchorage length of reinforcement in RCC. Explain the necessity of standard hooks of reinforcement in RCC.
	12.1-12.3	3		Outline the design steps of RCC rectangular beam in WSD method. State the minimum spacing of reinforcing bars in RCC beam. Design a simply supported RCC rectangular beam in WSD method.
08	12.4-12.5	1		Design a semi-continuous RCC rectangular beam in WSD method. Design a continuous RCC rectangular beam in WSD method.
	13.1-13.3	2		Differentiate WSD and USD method. Explain the stress diagram of loaded beam with showing the actual & equivalent rectangular stress distribution of ultimate load. State the load and load factors used in USD method.
	13.4-13.6	3		Mention the notations used in flexure formula in USD method. Express the derivation of the flexure formula in USD method. Solve problems of flexure formula based on USD method.
09	14.1-14.2	1		Outline the design steps of RCC rectangular beam in USD method. Design a simply supported RCC rectangular beam in USD method.
	14.3-14.4	2		Design a semi-continuous RCC rectangular beam in USD method. Design a continuous RCC rectangular beam in USD method.
	15.1-15.2	3	CT-2	Determine the design load; shear force and bending moment of RCC cantilever & overhanging beams. Design a cantilever RCC rectangular beam.
10	15.3-15.4	1		Design an overhanging RCC rectangular beam. Describe the technique of curtailment of reinforcement in cantilever RCC beams.
	16.1-16.5	2		Define T-beam. Identify the different parts of a typical T-beam. Determine the width of flange of T-beam considering span length and slab thickness. State the ratio of width of web to the depth of web for T-beams. Distinguish between RCC rectangular beam and T-beam.
	17.1-17.3	3		Determine the depth and width of a simply supported T-beam in respect to shear force. Outline the design steps of RCC T-beam in WSD method. Design a simply supported RCC T-beam in WSD method.
11	17.4-17.5	1		Design a semi-continuous RCC T-beam in WSD method. Design a continuous RCC T-beam in WSD method.
	18.1-18.3	2		State the meaning of double reinforced beam. Differentiate between RCC single and double reinforced beam. Outline the design steps of double reinforced beam.
	18.4-18.6	3		Design a simply supported double reinforced beam. Design a semi-continuous double reinforced beam. Design a continuous double reinforced beam.
12	19.1-19.2	1		Determine the area of the wall to be considered in determining the design load for RCC lintels. Outline the design steps of RCC lintel.
	19.3	2	Q-2	Design a RCC lintel over doors and windows.
		3		Review the syllabus.

### **REFERENCE BOOKS**

1. Design of Concrete Structures  
-by G Winter, L C Urquhart, C E O'Rourke, A H Nilson
2. R C C Design  
-by Abul Faraz Khan