7ᵗʰ Semester Regular/Back Examination 2017-18
Design of Advanced Concrete Structures
BRANCH : CIVIL
Time: 3 Hours
Max Marks: 70
Q.CODE: B340
Answer Question No.1 which is compulsory and any five from the rest.
The figures in the right hand margin indicate marks.
Use of relevant IS Codes are allowed.

Q1		**Answer the following questions :**	**(2 x 10)**
	a)	The IS Code, IS13920 is used for what purpose?	
	b)	State the various earthquake zones.	
	c)	Draw a figure and show different components of a cantilever retaining wall.	
	d)	State the parameters, on which the term, S_a/g depends in earthquake resistant design.	
	e)	State the various types of watertanks used for various purposes.	
	f)	Draw a diagram to show the storey shear distribution at various floors levels in a multi-storey building subjected to earthquake loading.	
	g)	What are the various types of loads which act on a bridge structure.	
	h)	State the various types of stresses generated in eccentric prestressing. Draw a figure to show the stresses.	
	i)	What is the minimum grade of concrete used for pretensioned prestressed members.	
	j)	State the various types of IRC loading.	

Q2	A 3 storied office building of 30 m x 30 m is to be constructed at Bhubaneswar in hard soil. Calculate the lateral forces and respective storey shears for the frame structure considering the following data. Frame spacing = 4 m centre to centre, bay width = 5 m centre to centre, floor thickness including finish = 15 cms, each column size = 40 cm x 40 cm, girders below floor slab = 30 cms x 40 cms, live load = 2 kN/m², damping = 5%, each floor height is 3m. S_a/g = 2.5 and I/R =0.25. Assume any other data, if required. Draw the storey shear diagram.	**(10)**

Q3	Design the stem a cantilever retaining wall using the following data. Height of embankment above GL = 3 m. Density of soil = 18 kN/m³. SBC of soil = 150 kN/m², angle of repose = 30 degree. Coeff of friction = 0.35, Assume M25 concrete and Fe 415 steel.	**(10)**

Q4	Design the long wall of an open rectangular water tank of size 3mx 8m c/s area and 4m deep, resting on ground using M20 concrete and Fe415 steel. Show the reinforcement detailing. Assume any other data if required.	**(10)**

Q5	**a)**	Draw the c/s and longitudinal section of a slab culvert and show different components.	**(5)**
	b)	Distinguish among various types of IRC loadings. What is the importance of IRC loading in bridge engineering?	**(5)**

Q6 a) Explain the difference between pre-tensioning and post-tensioning in a prestressing system. **(6)**

b) State the various types of losses which occur separately for pre-tensioned and post-tensioned members. **(4)**

Q7 A prestressed concrete beam of rectangular c/s having width of 150 mm and depth of 300 mm with an effective span of 10m carries a live load of 6.0 kN/m and a concentrated load of 10kN acts at the centre of the span. The beam is subjected to a concentric prestressing force of 150 kN acting over a horizontal cable. Calculate the various stresses generated at top and bottom fibres of the member at the centre of the beam and calculate the resultant stresses. Draw separate diagrams for individual stresses and resultant stresses. **(10)**

Q8 **Write short answer on any TWO:** **(5 x 2)**
a) Moment resisting frame system and load bearing wall system
b) Stability requirements for a retaining wall
c) Principle of prestressing
d) Impact loading and calculation of impact factor