

GUJARAT TECHNOLOGICAL UNIVERSITY

BE - SEMESTER-VII (NEW) EXAMINATION – WINTER 2017

Subject Code: 2170607

Date: 07/11/2017

Subject Name: Design of Reinforced Concrete Structures

Time: 10.30 AM to 01.30 PM

Total Marks: 70

Instructions:

1. Attempt all questions.
2. Make suitable assumptions wherever necessary.
3. Figures to the right indicate full marks.
4. Draw neat and clean figures whenever required.
5. IS 456, IS 3370, IS 875, SP 16, IS 1893, IS 1343, IS 13920 are permitted.
6. Use M20 grade of concrete and Fe415 grade of steel, if not given.

MARKS

- Q.1**
- (a) For the building lay out shown in fig.01 with following details, Draw the load distribution diagram and estimate the loads on a typical floor beams B11 & B12. **03**
Number of storey: G+3
Floor to floor height: 3.50 m
External walls: 250 mm including plaster
Internal walls: 150 mm including plaster
Imposed load: Roof = 1.5 kN/mm^2 , Floor = 4.0 kN/mm^2
Floor finish: Roof = 1.5 kN/mm^2 , Floor = 1.0 kN/mm^2
Materials: M20 and Fe415
- (b) Analyze the continuous beam B11-B12 at typical floor level of a given layout (fig.01) by substitute frame method. **04**
- (c) Design the continuous beam B11-B12 at typical floor level of a given layout (fig.01) for flexure and shear. Provide necessary checks if any. Draw diagram of beams showing reinforcement details. **07**
- Q.2**
- (a) State the guide lines for preparation of structural layout for building. **03**
- (b) Write the steps with codal provisions for determination of lateral loads acting at nodal points of a residential building due to wind. **04**
- (c) Determine the design moment for the interior panel of flat slab without drop and column head with following data: **07**
i) Slab = 20 m x 30 m ii) Panel size = 4m x 6m iii) Live load = 4 kN/m^2 iv) Floor finishes = 1 kN/m^2 v) Size of column = 500 mm x 500 mm vi) Floor to floor height = 4.0 m. Use M20 and Fe 415.
- OR**
- (c) Explain various elements of Flat slab with neat sketches. Mention advantages & Disadvantages of Flat slab. **07**
- Q.3**
- (a) The cantilever retaining wall has to retain the earth with a horizontal top 3.5 m above ground level. Density of earth is 18 kN/m^3 . Angle of internal friction ϕ is 30 degree. SBC of soil is 200 kN/m^2 . Coefficient of friction μ is 0.5. Determine dimensions of the retaining wall. Use M20 and Fe 415. **03**
- (b) For prob. 3 (a) above, check the stability of wall. **04**
- (c) For prob. 3 (a) above, design stem and draw diagram showing reinforcement details. **07**

OR		
Q.3	(a) The counterfort retaining wall has to retain the earth with a horizontal top 4.0 m above ground level. Density of earth is 15 kN/m ³ . Angle of internal friction ϕ is 30 degree. SBC of soil is 200 kN/m ² . Coefficient of friction μ is 0.6. Determine dimensions of the retaining wall. Use M20 and Fe 415.	03
	(b) For prob. 3 (a) above, check the stability of wall.	04
	(c) For prob. 3 (a) above, design stem and draw diagram showing reinforcement details.	07
Q.4	(a) The circular water tank of 450 kl capacity is required to construct on the ground. The depth of water is 4.3 m. Considering flexible base, determine dimensions of the tank. The free board is 0.2 m. Use M30 and Fe 415.	03
	(b) For prob. 4 (a) above, design base slab of tank.	04
	(c) For prob. 4 (a) above, design tank for hoop tension and draw detailed plan and section of water tank showing all the dimensions and reinforcements.	07

OR		
Q.4	(a) The rectangular water tank open at top resting on ground having size 3.6 m x 8.5 m x 3 m. Design short wall. Use M30 and Fe 415.	03
	(b) For prob. 4 (a) above, design long wall.	04
	(c) For prob. 4 (a) above, design base slab and draw detailed plan and section of water tank showing all the dimensions and reinforcements.	07
Q.5	(a) Explain capacity design concept.	03
	(b) Explain various Joints used in water tank.	04
	(c) Write the steps of analysis of multistoried building subjected to seismic force by seismic coefficient method.	07

OR		
Q.5	(a) Explain earthquake resistant design philosophy.	03
	(b) Explain with sketches various types of supporting arrangements for over head water tanks.	04
	(c) A five storey office building has size of 30 m x 30 m. It is located in Bhuj and resting on hard soil. The total weight of building is 11600 kN and height of the building is 18.5 m. The building is provided with special moment resisting frame with infill brick panels, calculate design base shear and distribute the shear along the height considering ground storey height 4.5 m by seismic coefficient method.	07

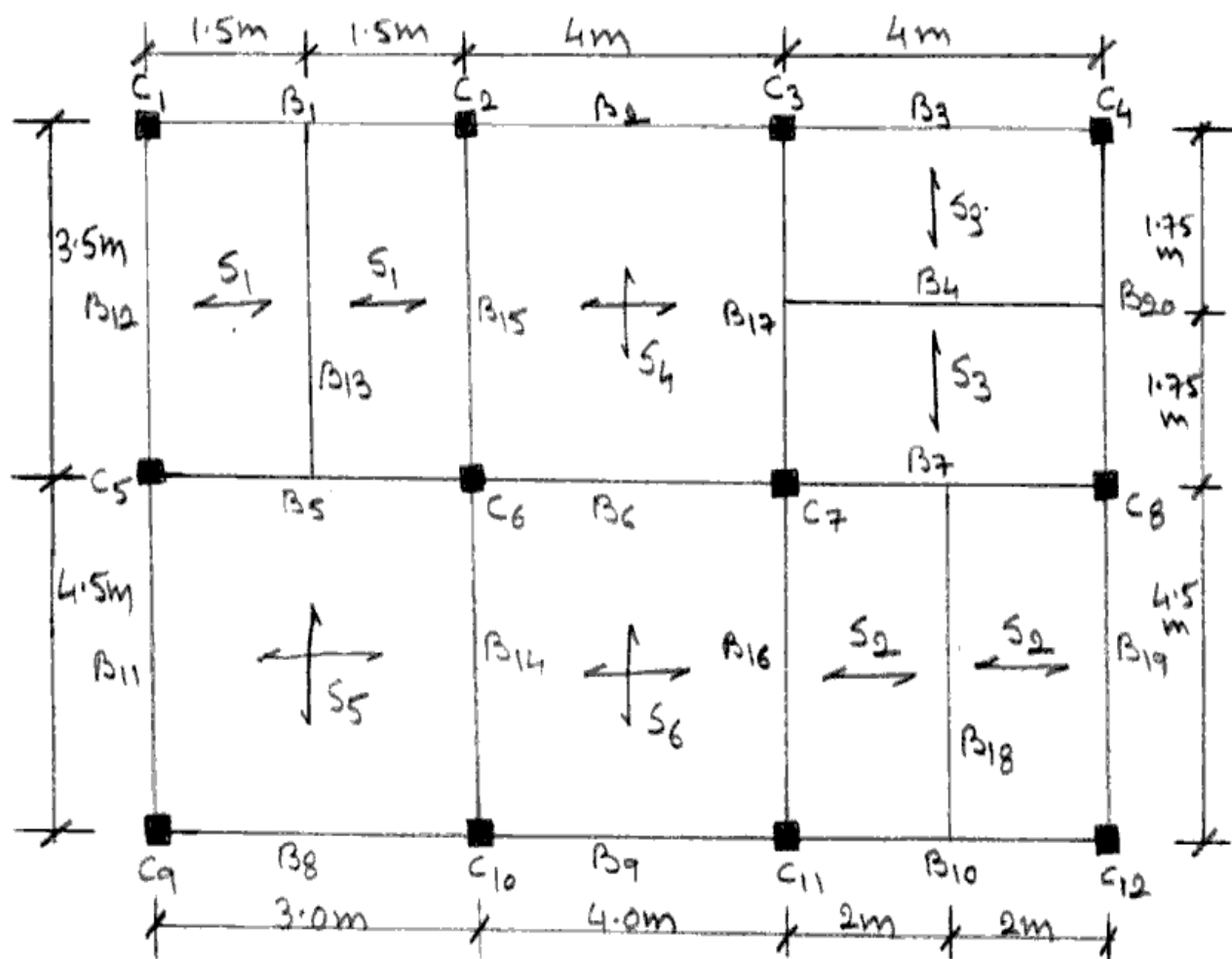


Fig.01
