VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK

VI SEMESTER

CE6601 – Design of Reinforced Concrete & Brick Masonry Structures
Regulation – 2013
Academic Year 2018-19
Prepared by

Ms. R.ANJUGHAP PRIYA, Assistant Professor/Civil Engg

Mr.N.VINOTH KUMAR , Assistant Professor/Civil Engg

Mr.M.MURUGAN, Assistant Professor/Civil Engg

VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF CIVIL ENGINEERING

SUBJECT CODE/NAME: CE6601 - Design of Reinforced Concrete & Brick Masonry Structures

SEM / YEAR: VI/III

QUESTION BANK

(As per Anna University 2013 Regulation)

UNIT I - RETAINING WALLS

Design of Cantilever and Counterfort Retaining walls.

PART A

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Describe about Retaining wall and its functions?	BT-2	Understanding
2.	Define angle of internal friction.	BT-1	Remembering
3.	Classify the types of retaining walls.	BT-3	Applying
4.	Write about cantilever retaining wall.	BT-1	Remembering
5.	Give a detail about counter fort retaining wall.	BT-3	Applying
6	List out the forces acting on a retaining wall.	BT-1	Remembering
7.	Define Active Earth pressure and Passive earth pressure.	BT-1	Remembering
8.	What are the stability requirements for retaining wall.	BT-6	Creating
9.	What factors govern the spacing of counterforts?	BT-2	Understanding
10.	What is the Structural action between Cantilever and Counterfort type retaining wall?	BT-4	Analyzing
11.	How the toe slab of a counterfort retaining wall is designed?	BT-4	Analyzing
12.	What is the function of weep hole in retaining wall construction?	BT-5	Evaluating
13.	Define Surcharge.	BT-1	Remembering
14.	Report why counterforts are provided in counterfort retaining wall.	BT-2	Understanding

15.	Illustrate the use of shear key in retaining wall.	BT-3	Applying
16.	Report why counterforts are provided in counterfort retaining wall	BT-5	Evaluating
17.	Describe the structural action of heel & toe of a retaining wall	BT-2	Understanding
18.	State Rankine's theory of Earth pressure.	BT-1	Remembering
19.	Write down the equation of co-efficient of active & passive earth pressure	BT-4	Analyzing
20.	In what circumference using retaining wall.	BT-6	Creating

PART B

1.	Design a RCC cantilever retaining wall having a 5m tall stem. The wall retains soil level with its top. The soil weighs 18000N/m^3 and has an angle of repose of 30^0. The safe bearing capacity of the soil is 180kN/m^2. Use M20 concrete and Fe415 steel. Show its reinforcement details.	BT-1	Remembering
2.	Design the stem of the counterfort retaining wall if the height of the wall above the ground level is 6m. SBC of the soil is 170kN/m^2.Angle of internal friction is 32^0.Density of soil is 18kN/m^3.Spacing of counterfort 3m c/c. Take coefficient of friction between soil and concrete as 0.5.Adopt M20 and Fe500 HYSD. Check the stability.	BT-1	Remembering
3.	Estimate the reinforcement and design the main bars of 12mm dia and distribution bars of 8mm dia required at the bottom section of the stem of a counterfort retaining wall to retain a horizontal backfill level with its top for the following data. Height of the stem = 6.5m. Thickness of stem at top and bottom: 250mm and 450mm respectively. Density of soil is 18kN/m^3 and angle of repose is 30°. Centre to Centre spacing of counterforts = 3m Materials used in the construction are M25 grade of concrete and Fe415 steel reinforcement.	BT-5	Evaluating

4.	Find out the reinforcement detail and Design a T-shaped cantilever retaining wall to retain earth embankment 3m high above ground level. The embankment is surcharged at an angle of 16^0 to the horizontal. The unit weight of earth is 18 kN/m^3 and its angle of repose 30^0. The safe bearing may be taken as $100kN/m^2$ at a depth of 1m below the ground. The coefficient of friction concrete and soil may be taken as 0.5	BT-3	Applying
5.	Analyse the stability of a counterfort retaining wall to the following particulars. Height of the wall above the general ground level = 5.5m Safe bearing capacity of the soil = $160kN/m^2$ Angle of repose of the soil = 30^0 Weight of soil = 16000 N/m^3 Use M20 concrete and Fe 415 steel	BT-4	Analyzing
6.	Find out the reinforcement detail and design a T shaped cantilever retaining wall for the following data. Height of the wall above ground 3.5m Depth of foundation 1.3m Safe Bearing Capacity of the Soil=$140kN/m^2$ Angle of internal Friction of Soil=25^o The Coefficient of friction between base slab and concrete=0.44 Unit weight of earth fill is $18kN/m^3$. Adopt M25 grade concrete and Fe500 grade steel.	BT-3	Applying
7.	a) Explain under what circumstances counterforts are preferred. b) What are the methods of designing shear key in a retaining wall?	BT-2	Understanding
8.	Design and determine the main bars of 16mm dia and distribution bars of 8mm dia required at the bottom section of the stem of a cantilever retaining wall to retain a horizontal backfill level with its top for the following data. Height of the stem = 4.5m. Thickness of stem at top and bottom: 200mm and 450mm	BT-1	Remembering

	respectively. Density of soil is 18kN/m³ and angle of repose is 30°. Materials used in the construction are M25 grade of concrete and Fe415 steel reinforcement.		
9.	Describe the steps involved in the design of counterfort retaining wall.	BT-6	Creating
10.	Design stem and counterfort portion of a retaining wall for the following data. Height of the wall = 8.7m Density of soil = 18kN/m^3 Spacing of counterfort = 3.5m Angle of internal friction of soil = 30^o. Safe Bearing Capacity of the Soil=170kN/m^2 The Coefficient of friction between base slab and concrete=0.55 Factor safety against sliding and over turning is 1.45 Adopt M20 grade concrete and Fe415 grade steel. Sketch the reinforcement details. Stability check is not necessary.	BT-4	Analyzing
11.	Design a cantilever retaining wall to retain earth embankment 4.5 m above ground level. The density of earth is 18KN/m^3 and its angle of repose is 30^0. The embankment is horizontal at its top. The safe bearing capacity may be taken as 200KN/m^2 and the coefficient of friction between soils and concrete is 0.5. Use M20 concrete and Fe 415 grade steel.	BT-1	Remembering
12.	A counterfort retaining wall is to retain the earth 6m high above the ground level. The unit weight of the retained earth is 18KN/m^3 and the angle of repose is 30^0. The horizontal surface of back fill is subjected to a live load surcharge of 20KN/m^2. The safe bearing capacity of soil is 200KN/m^2 the coefficient of friction between base slab and soil is 0.53. Use M20 concrete and Fe 415 grade steel carry out the stability analysis and the design shear key is necessary.	BT-4	Analyzing

13.	a) What are the types of retaining wall and briefly explain with neat sketches. b) Briefly explain the components of retaining wall.	BT-2	Understanding
14.	a) Explain the general design requirements for retaining wall and counterfort retaining wall. b) Describe the external stability requirements in retaining wall.	BT-2	Understanding

PART C

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Design a counterfort retaining wall, if the height of the wall is 5.5m above ground level. SBC of soil is 180kN/m^2. Angle of friction: 30^o. Unit weight of backfill is 18kN/m^3. Keep spacing of counterforts as 3m. Co-efficient of friction between concrete and soil =0.5. Adopt M20 concrete and Fe415 steel.	BT-5	Evaluating
2.	Design a counterfort retaining wall to suit the following data: Height of wall above the ground level: 6m SBC of soil at site:160kN/m^2 Angle of internal friction: 33^o Density of soil: 16kN/m^3 Spacing of counterforts: 3m c/c Materials: M20 concrete & Fe415 grade steel Sketch the details of reinforcements in the slab.	BT-4	Analyzing
3.	Design the stem of a retaining wall to retain earth embankment 3m high above ground level. The unit weight of earth is 18kN/m^2 and its angle of repose is 30^o. The embankment is horizontal at its top. The safe bearing capacity of soil is 100kN/m^2 and the co-efficient of friction between soil and concrete is 0.5. Adopt M20 concrete and Fe415 steel. The factor of safety against overturning and sliding as 1.4.	BT-6	Creating

4.	Design an upright slab of counterfort retaining wall to the following particulars. Overall height of the wall = 7m Weight of soil = 16000 N/m^3 Angle of repose of the soil = 35^0 Surcharge angle = 15^0, Use M20 concrete and Fe415 steel and show its reinforcement details.	BT-1	Remembering

UNIT II- WATER TANKS

Design of rectangular and circular water tanks both below and above ground level- Design of circular slab.

PART A

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Differentiate between Hoop stress and meridional compressive stress.	BT-4	Analyzing
2.	List out the three factors that must be considered while designing a RCC tank.	BT-1	Remembering
3.	Classify the types of water tanks?	BT-2	Understanding
4.	List the methods available for the analysis of circular tank?	BT-1	Remembering
5.	List out the boundary conditions for wall with hinged base and free top.	BT-1	Remembering
6.	What is the necessary of providing sliding joint in a water tank?	BT-2	Understanding
7.	Classify the joints which are provided between the circular water tank wall and the floor.	BT-2	Understanding
8.	What is a Ring beam?	BT-1	Remembering
9.	What are the types of joints used in concrete water tank?	BT-1	Remembering
10.	Report the diameter of a circular tank which is having a flexible base for capacity of 200000 liters. The depth of water is to be 4m, including a free board of 200mm.	BT-5	Evaluating
11.	Predict the reasons why bracings are provided in the stagings of a water tank.	BT-4	Analyzing

12.	For what conditions underground tanks are designed and checked.	BT-5	Evaluating
13.	Summarize the formula for Meridional thrust in design of domes in Overhead tank.	BT-2	Understanding
14.	Write down the design principles of Rectangular water tank.	BT-3	Applying
15.	Define Hoop stress.	BT-1	Remembering
16.	Justify why uplift pressure is critical on the floor of underground tanks	BT-6	Creating
17.	Develop the conditions under which the walls of underground water tanks designed and checked	BT-6	Creating
18.	Sketch the Radial & circumferential moment diagram for a circular slab supported at 4 ends & carrying UDL.	BT-3	Applying
19.	Sketch the Radial & circumferential moment diagram for a circular slab fixed at ends & carrying UDL.	BT-3	Applying
20.	List out the forces acting on walls of Water tanks.	BT-4	Analyzing

PART B

1.	a) Briefly explain the types of water tanks? b) Describe what are the stresses normally acting in a water tank?	BT-2	Understanding
2.	Explain the step by step procedure in design of rectangular and circular water tank resisting on ground.	BT-2	Understanding
3.	Design the side wall of a circular tank of capacity 5 lakh litres of water. The depth of the tank is limited to 4 m. Free board of 200 mm. The joint between the wall and base is flexible. The base slabs rests on the ground. Use M20 grade concrete.	BT-1	Remembering
4.	A rectangular RCC walls tank with an open top is required to store one lakhs litres of water. The inside dimensions of the tank may be taken as 6m x 4m. The tank rests on wall on all the four sides. Design the side walls of the tank using M20 grade concrete and Fe500 steel.	BT-1	Remembering
5.	A circular water tank open at top and resisting on a rigid soil has inner diameter 3m and height 3 m. Base joint between wall and base slab shall be assumed as hinged. Using M20 concrete and Fe 415 steel.	BT-2	Understanding

	Design the wall and determine the reinforcement.		
6.	A square water tank 4mx4mx3m in height is supported on ground and open at top. Assuming the base of the wall as hinged, design the thickness of the wall and reinforcement for the wall, for moment in vertical direction only.	BT-5	Evaluating
7.	A rectangular tank 4m x 6m x 3m deep. The tank is open at top and the walls are rigidly fixed to the base which rests on firm ground. Use M20 Mix.	BT-1	Remembering
8.	A circular slab is to be provided for 6m diameter circular hall. The live load on the slab is 3500N/mm^2. Calculate the reinforcement and design the slab. Assume partially fixity at the support. Use M20 grade concrete and Fe415 grade of steel	BT-4	Analyzing
9.	Design an underground tank of internal dimensions 12 m x 5 m x 2.8m including a free board of 0.30 m. The dry density of soil is 16 kN/m^3 and the angle of repose of dry soil is 30^0. The outside soil which is 0.3 m below the top of tank wall may be taken as fully saturated up to its full height. Design the side walls of the tank.	BT-4	Analyzing
10.	Write down the radial moment and circumferential moment for the 6 various cases of support conditions with near sketch.	BT-6	Creating
11.	Design an overhead flat bottomed cylindrical water tank for a capacity of 100,000 litres. The depth of water is to be 3.6m. Free board = 200 mm the top of the tank is covered with a dome. Design the dome, top ring beam and side walls of the tank.	BT-1	Remembering
12.	Design an underground tank of internal dimensions 8 m x 2 m x 2 m. the soil surrounding the tank is likely to get wet. Angle of repose of soil in dry state is 30^{0}and in wet state is 6^{0}soil weighs 20 kN/m^3.	BT-3	Applying
13.	Design staging for a circular water tank to a capacity of 2 lakh litres. The tank is a height of 20m above ground level. Use M30 concrete and Fe415 steel.	BT-4	Analyzing
14.	A circular room has 5m diameter from inside. Design a circular roof slab for the room to carry a super imposed load of 3800N/mm^2. Assume that the slab is simply supported. Use M15 & Fe 250 steel.	BT-3	Applying

PART C

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Design a circular tank with fixed base for capacity of 4 lakh litres. The depth of water is to be 4 m. Free board = 200mm. Use M20 grade concrete and grade-I mild steel. Permissible direct tensile stress in concrete = 1.2 N/mm^2 Permissible stress in steel in direct tension = 100 N/mm^2 Sketch the details of reinforcements in tank walls. Adopt IS Code Tables for coefficients.	BT-5	Evaluating
2.	Design the side walls of a square RCC tank of capacity 80,000 litres of water. Depth of water tank = 3.8m. free board = 0.2m. Adopt M20 concrete and Grade-I steel. Tensile stresses in steel are limited to 100N/mm^2 at water face and 125 N/mm^2 away from face. Sketch the details of reinforcements in the walls of the tank.	BT-1	Remembering
3.	Design an RCC tank of internal dimensions 10m x 3m x 3m. The tank is to be provided underground. The soil surrounding the tank is likely to get wet. Angle of repose of soil in dry state is 30^0 and in wet state is 6^0. Adopt suitable working stresses. Soil weighs 20 kN/m^3. Adopt M20 concrete and Grade-I steel.	BT – 6	Creating
4.	Design an underground water tank 12m x 5m x 2.8m with a free board of 0.2m. The weight of subsoil is 16KN/m^3. Angle of friction of soil is 34°. The subsoil is saturated at ground level. Safe bearing capacity of soil is 165kN/m^2. Use M20 concrete and Fe415 steel.	BT 4	Analysing

UNIT 3-SELECTED TOPICS

Design of staircases (ordinary and doglegged) – Design of flat slabs – Principles of design of mat foundation, box culvert and road bridges.

PART A

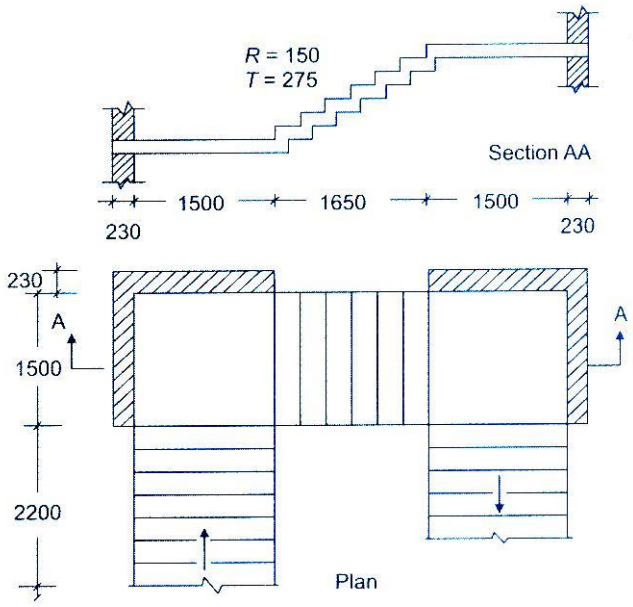
Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1	Reproduce a technical terms used in a staircase.	BT-6	Creating
2	How will you calculate the load effects on a stairs waist slab spanning in the longitudinal direction?	BT-4	Analyzing
3	What are the normal range of tread and rise values of steps of a staircase in residential building and public buildings?	BT-5	Evaluating
4	Define tread, rise & flight of a stair case.	BT-1	Remembering
5	List the different types of stairs.	BT-1	Remembering
6	What are the limitations of direct design method of flat slabs?	BT-5	Evaluating
7	Define drop panel and column head and draw a neat sketch.	BT-1	Remembering
8	Write the purpose to use waffle slab?	BT-2	Understanding
9	Distinguish between one-way shear and punching shear in flat slabs.	BT-4	Analyzing
10	Under what circumstances flat slab construction is preferred	BT-1	Remembering
11	Differentiate column strip and middle strip in flat slab.	BT-4	Analyzing
12	Examine when mat foundation is resorted to a structure?	BT-6	Creating
13	Sketch mat foundation and explain it.	BT-3	Applying
14	Explain about box culvert shortly.	BT-2	Understanding
15	Summarize the advantages of box culvert over slab culvert	BT-2	Understanding
16	Illustrate the conditions of loading moments should be calculated to get the max moment in a box culvert design.	BT-2	Understanding
17	List out components of a bridge. Explain the functions of a pier.	BT-1	Remembering
18	What are the causes for arising the longitudinal forces in a road bridge	BT-1	Remembering
19	Sketch the cross-section of a box culvert and indicate the components.	BT-3	Applying

20	Identify the class 'A' loading?	BT-3	Applying

PART B

1.	A Longitudinal type of a staircase spans a distance of 3.75 m c/c of beams. The flight consists of 15 steps. Take rise = 175 mm, tread is 250 mm. Assuming grade 25 concrete and Fe 415 steel, Calculate the reinforcement and design the staircase for a live load of 5 kN/m^2. Assuming the breadth of the staircase as 1.4 m.	BT-1	Remembering
2.	An intermediate flight of a staircase is supported only at the edges of landing (support-Perpendicular to the direction of the flight). Height between landings is 1.5m. The Flight has steps consisting of 10 risers (each rise=150mm) and a treads (each tread=250mm). The steps are supported on a waist slab. Landing is 1 m width. Support width is 300 mm each. Calculate the reinforcement and design the waist slab and landing for bending moment alone. Use M20 concrete and Fe 415 steel. Live load on stair is 3.0kN/m^2. Width of flight = 1.5 m.	BT-1	Remembering
3.	Design a dog-legged stair for a building in which the vertical distance between floors is 3.6 m. The stair hall measures 2.5 m x 2.5 m. The live load may be taken as 2.5 kN/m^2. Adopt M20 concrete and Fe 415 steel.	BT-4	Analyzing
4.	A flight of a dog-legged staircase has the following details: Going =2.25 m Landing width = 1.25 m Raise of a flight = 1.5 m Support width = 300 mm Choosing appropriate dimensions for rise and tread, and taking the flight to span longitudinally between the supports, Determine the reinforcement of the flight. Assume live load as 3 kN/m^2	BT-1	Remembering
5.	Design a dog-legged stair for a building in which the vertical distance between the floors is 3.6m. The Stair hall measures 2.4m x 5m (inner dimensions). The live load on the stair is 3000N/m^2.Adopt M20 Grade	BT-4	Analyzing

	concrete and Fe415Grade Steel.		
6.	Explain the design steps of a mat foundation based on conventional rigid method.	BT-2	Understanding
7.	Estimate the interior panel of a slab, 5.5 m x 5.5 m for a live load of 5000N/mm^2. Use M20 Grade concrete and Fe415Grade Steel.	BT-5	Evaluating
8.	An interior panel of a flat slab floor is 6m x 6m along column centre lines. Live load on floor is 3kN/m^2.Supporting column diameter is 500 mm. Choosing the thickness of the slab (from stiffness criteria) and appropriate dimensions for column head and drops, calculate the design moments and shear forces. Use direct design method.	BT-1	Remembering
9.	Calculate the reinforcement and design the interior panel of a flat slab for a live load of 5kN/m^2 and a column grid of 6mx6m. Columns are of 600mm diameter. Drops shall be provided. Show the reinforcement details in the flat slab. Use M20 concrete and Fe415 steel.	BT-3	Applying
10.	Write the principle of design of box culvert.	BT-2	Understanding
11.	An exterior panel of a flat slab floor is 6m x 6m along column centre lines. Live load on floor is 3kN/m^2.Supporting column diameter is 500 mm. Choosing the thickness of the slab (from stiffness criteria) and appropriate dimensions for column head and drops, calculate the design moments and shear forces. Use direct design method.	BT-6	Creating
12.	A straight stair in residential building is supported on wall on one side and stringer beam on the other side. The risers are 150 mm and treads are 250mm, and the horizontal span of the stair as 1.2m. Design the steps use M15 grade concrete.	BT-3	Applying
13.	Explain briefly about the various types of reinforced concrete bridges with neat sketch.	BT-2	Understanding
14.	Design a tread-riser type staircase flight between the landings shown in fig the landing slabs are supported on the adjacent edges. Adopt a live load of 5KN/m^2, use M20 grade concrete Fe 415 HYSD bars.	BT-4	Analyzing

PART C

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Design the interior panel of a flat slab with drops for an office floor to suit the following data: Size of office floor = 20m x 20m Size of panels: 5m by 5m Loading Class = 4kN/m^2 Materials: M20 Concrete, Fe 415 HYSD bars.	BT 4	Analysing
2.	What are the live loads considered in the design of concrete road bridges?	BT 2	Understanding
3.	When do you recommend approximate flexible method of design for mat foundation?	BT-1	Remembering
4.	Design one of the flights of stairs of a school building spanning between landing beams to suit the following data.	BT 6	Creating

	Type of staircase : waist slab type. Number of steps in flight = 12. Tread = 300 mm and Rise = 160 mm. Width of landing beams = 400 mm. Materials Used M20 concrete and Fe415 steel.		

UNIT 4- YIELD LINE THEORY

Assumptions - Characteristics of yield line - Determination of collapse load / plastic moment Application of virtual work method - square, rectangular, circular and triangular slabs – Design problems.

PART A

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Write down the assumptions made in yield line theory.	BT-6	Creating
2.	Summarize the characteristic features of yield lines.	BT-2	Understanding
3.	State and explain the principle of virtual work.	BT-4	Analyzing
4.	Name the two methods of determining the ultimate load capacity of reinforced concrete slabs.	BT-1	Remembering
5.	Outline the direction of yield line in one way slab and two way slab.	BT-2	Understanding
6.	Define upper and lower bound theory.	BT-1	Remembering
7.	Discuss about the yield line theory and its limitation.	BT-2	Understanding
8.	Sketch and formulate the yield line pattern for a circular slab continuous over its edges.	BT-5	Evaluating
9.	Outline the sign conventions used in yield line theory for simply supported and fixed edges, positive and negative yield lines.	BT-3	Applying
10.	Differentiate the term orthotropically and isotropically reinforced slab.	BT-4	Analyzing
11.	Formulate and sketch the yield line pattern for the rectangular reinforced concrete slab.	BT-6	Creating

12.	Why yield line theory for slab always yield upper bound solutions?	BT-1	Remembering
13.	Define: Unit load method.	BT-1	Remembering
14.	Write the formula for ultimate load capacity for isotropically reinforced equilateral triangular slab.	BT-3	Applying
15.	Define fracture line.	BT-1	Remembering
16.	Name the methods of yield line analysis.	BT-3	Applying
17.	Define the term reversal of stresses.	BT-1	Remembering
18.	Sketch and formulate the yield line pattern for a circular slab with simply supported edges.	BT-5	Evaluating
19.	Outline the yield line pattern for a square and triangle slab with simply supported edges.	BT-2	Understanding
20.	Explain in brief about the equilibrium method.	BT-4	Analyzing

PART B

1.	Find the collapse load for a square slab fixed all around the edges with following data: Size = 5m x 5m Reinforcement = 8mm dia @ 150mm c/c in both directions Total depth = 130mm Effective cover = 30mm Use M20 concrete and Fe415 steel.	BT-1	Remembering
2.	A square interior panel of an intermediate floor is of effective dimension 5m x 5m. The live load on the floor is 2.5kN/m^2. Finishes is 1kN/m^2. Analyse the slab using yield line approach and design the slab. Use M20 concrete and Fe 415 steel. Outline its reinforcement details.	BT-2	Understanding
3.	Solve the ultimate design moments for a rectangular simply supported slab panel using yield line approach. Hence the design moments for a simply supported rectangular slab 3 m x 4 m effective, subjected to a live load (working) of 2.5kN/m^2 and finish of 1 kN/$m^{2.}$ Assume suitable load factor.	BT-3	Applying

4.	Design a simply supported reinforced concrete circular roof slab for an assembly hall of inside diameter 11 m. The slab is supported on a 600 mm diameter column at its centre. The slab carries a total uniformly distributed load of 4 kN/m^2 inclusive of self-weight at service conditions. Design and estimate the slab using yield line analysis. Use M20 concrete and Fe415 HYSD bars.	BT-5	Evaluating
5.	A rectangular slab of size 4m x 6m is continuous on all the four sides. Assume a live load of $3kN/m^2$ and floor finish of 1 kN/m^2. Use M20 concrete and Fe 415 steel. Analyse the slab using yield line approach and design the slab. Show its reinforcement details.	BT-4	Analyzing
6.	Design a circular slab of 4m diameter, which is simply supported at the edges, to carry a service load of $4kN/m^2$. Adopt M20 Grade concrete and Fe 415 Grade steel. Assume load factors according to IS456:2000.	BT-1	Remembering
7.	A square slab of size 6m x 6m is reinforced with 10mm diameter Fe415 steel bars at a spacing of 180mm in both directions. The average effective depth may be taken as 120mm and overall depth as 150mm. Analyze and determine the permissible service load if it is simply supported all around. Adopt M20 concrete.	BT-4	Analyzing
8.	i) Explain in detail the methods of determining the ultimate load capacity of slabs. (8) ii) Sketch the yield line patterns of circular, square and rectangular reinforced concrete slabs. (5)	BT-4	Analyzing
9.	Calculate the ultimate load carrying capacity of a 4 m x 6 m slab continuous on all edges if yield moments are 25kNm/m for positive and negative moments respectively, they being uniformly loaded.	BT-3	Applying
10.	Illustrate the ultimate load for isotropically reinforced generalized triangular slab.	BT-2	Understanding
11.	Using Virtual work method, outline the expression for ultimate moment per unit length of the yield line in the case of	BT-2	Understanding

	isotropically reinforced square slab fixed on all edges and subjected to a uniformly distributed load.		
12.	Design a rectangular slab of 6m x 4m simply supported at the edges carrying a service load of 4kN/m^2. Assume the co-efficient of orthotropy as 0.75. Materials used are M20 grade concrete and Fe415 steel bars. Show its reinforcement details.	BT-1	Remembering
13.	A rectangular slab 4m x 5m is simply supported at the ends. Design the slab to carry a superimposed service load of 5kN/m^2, if the slab is to be isotropically reinforced. Adopt M20 grade concrete and Fe415 grade steel. Show its reinforcement details.	BT-1	Remembering
14	Estimate the ultimate moment of resistance of a simply supported slab 6m x 4.5m which is reinforced using 8mm diameter bars spaced at 100mm c/c. The thickness of slab is 125mm. Also calculate ultimate collapse load from first principles.	BT-6	Creating

PART C

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Design a circular slab of the following details: Diameter of slab-5.5m, Service live load- 4kN/m^2 Floor finishing load-1kN/m^2 Adopt M20 Grade concrete and Fe 415 Grade steel and simply supported along the edges.	BT-6	Creating
2.	A rectangular slab continuous on all edges supports an overall inclusive load of '*w*' kN/m^2 (ultimate). The slab is orthotropic with effective dimensions l_x x l_y. Derive a relation between '*w*' and the ultimate moment capacity of the slab. Use Virtual work method to find the ultimate moment capacity.	BT-1	Remembering
3.	Determine the ultimate load for isotropic of the following profiles simply supported on all edges carrying distributed load	BT-5	Evaluating

	throughout the slab. (i) Square slab. (8) (ii) Equilateral Triangular slab. (7)		
4.	A rectangular slab 3.5m x 5m in size simply supported at the edges. The slab is expected to carry a service load of $3kN/m^2$ and a floor finishing load of 1 kN/m^2. Analyze and design the slab if (i) It is isotropically reinforced & (ii) It is orthotropically reinforced with $\mu = 0.75$.	BT-4	Analyzing

UNIT 5- BRICK MASONRY

Introduction-Classification of walls-Lateral supports and stability-effective height of wall and columns-effective length of walls-design loads-load dispersion-permissible stresses-design of axially and eccentrically loaded brick walls.

PART A

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Discuss about the factors which contribute for eccentricity on brick wall.	BT-2	Understanding
2.	List the multiplying factors used in allowable compressive stress in brick masonry.	BT-4	Analyzing
3.	How will you calculate the effective length, effective height and effective thickness of a brick masonry wall?	BT-3	Applying
4.	What are the permissible stresses to be considered for the design of brick column?	BT-1	Remembering
5.	What is the minimum thickness of basement walls?	BT-1	Remembering
6.	Define slenderness ratio of a masonry wall.	BT-1	Remembering
7.	What is meant by basic stress of a masonry wall?	BT-1	Remembering
8.	Write short note on shape modification factor.	BT-3	Applying
9.	Obtain the stress reduction factor for an eccentrically loaded	BT-3	Applying

	masonry member with slenderness ratio of 12 and eccentricity to thickness ratio of 1/12.		
10.	List out the classification of brick masonry wall.	BT-4	Analyzing
11.	Why is it intended to limit the slenderness of the load bearing masonry walls.	BT-2	Understanding
12.	Explain why stiffeners are provided in the brick piers.	BT-6	Creating
13.	Classify the types of masonry walls used in building construction.	BT-2	Understanding
14.	Discuss about braced columns.	BT-6	Creating
15.	How will you evaluate the effective length of the brick wall when the wall is continuous?	BT-5	Evaluating
16.	What is the effective height of a masonry wall which has a lateral restraint as well as rotational restraint (that is full restraint) at bottom but has no restraint at the top.	BT-1	Remembering
17.	How will you determine the permissible stresses in the masonry?	BT-4	Analyzing
18.	Explain any two factors affecting the permissible stresses of masonry.	BT-2	Understanding
19.	List the types of mortars used for masonry works.	BT-1	Remembering
20.	Explain the term allowable compressive stress in brick masonry.	BT-5	Evaluating

PART B

1.	Determine the allowable axial load on column 300mm x 600mm constructed in first class brick work in CM 1:6 using modular bricks 200mm x 100 mm x 100mm. the height of pier between the footing and top of slab is 5.1m. The strength of units may be assumed as 10.5MPa.	BT-5	Evaluating
2.	Design an interior load bearing wall of a two storied building to carry 150mm thick R.C.C slab with 3m ceiling height. The wall is unstiffened and supports 4m wide span. Take Live load on floor and floor is $2kN/m^2$ Weight of floor finish=$1kN/m^2$ Weight of Terrace=$1.8kN/m^2$ Unit Weight of Masonry=$19.2kN/m^3$.	BT-4	Analyzing

3.	Explain in detail about the classification of walls with neat sketch.	BT-2	Understanding
4.	Design a solid square masonry column of height 2000mm to carry an axial load of 150kN. The column is tied at the top and bottom. Include the self-weight of the column for the design. Show its reinforcement details.	BT-1	Remembering
5.	A single room building 3m x 7m is provided with a brick masonry wall supporting a RC roof 150mm thick. The slab supports a live load of 1.5kN/m^2 along with a finish of 2kN/m^2. A parapet 750mm in height and 230mm thick is provided all around. Height of wall from basement to the underside of the roof is 3m. Assuming that there are no openings in the walls calculate and design the thickness of long wall. Brick strength of 5 N/mm^2 and 1:5 mortar mixes are to be used. Nominal sized bricks are to be used.	BT-3	Applying
6.	A masonry wall is subjected to an axial load of 180 kN and the height of the wall is 3.6m. Design the wall.	BT-6	Creating
7.	Design the masonry wall is subjected to an axial load of 150 kN and bending moment of 30kN-m. The height of the wall is 4m. Show its reinforcement details.	BT-1	Remembering
8.	Design an exterior wall of a workshop building 3.75m high carrying steel trusses at the top at 5 m spacing. The wall is securely tied at the roof and floor level. Thickness of wall and piers shall be assumed suitably.The loading shall be assumed as follows: i) Concentrated reaction from the roof trusses = 30kN acting the center of the wall. ii) Roof loading = 10 kN/m iii) Ignore wind load.	BT-2	Understanding
9.	Determine the reinforcement of a solid square masonry column of height 2.5m to carry an axial load of 100kN.	BT-4	Analyzing
10.	An interior wall of a two storied building is 4.2m long. The	BT-4	Analyzing

	height of each storey is 3m. The width of room on one side of the wall is 4m and other side is 3.2m. The total load on each floor is 8kN/m^2 (Including self-weight). Determine the thickness of wall required at the plinth level.		
11.	In the wall of a room, 5m long 300mm thick and 3.5m high there are three openings 0.9m wide and 1.5m high. The portion of brickwork between the windows is 200mm wide each. if the load/m length of the wall at the lintel level is 40kN/m, What is the minimum mortar strength that must be used in the wall. Strength of bricks may be taken as 9MPa.	BT-1	Remembering
12.	Determine the safe axial load per metre length of a solid brick masonry wall of 230mm thick. The height of the wall is 3.3m. The wall is continuous at both ends between the cross walls of spacing 6m. M1 mortar and bricks of compressive strength 7.5Mpa are used.	BT-3	Applying
13.	Design a brick wall to carry a load of 40kN/m. The height of wall is 3m. Strength of bricks is 10N/mm^2. Use cement mortar ratio 1:6.	BT-1	Remembering
14.	A brick masonry wall supports a roof slab (one way slab, thickness = 125mm) along with a parapet of 230mm thick and 700mm height. Live load on slab is 1.5kN/m^2 and finish is 2kN/m^2. Effective span of the roof slab is 3m.The height of the wall from center of slab to top of footing is 3m. Length of the wall between centres of cross walls is 7m. Assume that there are no openings in the wall and cross walls. The wall and roof slab are for a single room. Nominal brick unit strength 5N/mm^2 is available. Mortar to be used in M1. Estimate the thickness of the wall.	BT-2	Understanding

PART C

Q.NO	QUESTIONS	BT LEVEL	COMPETENCE
1.	Determine the reinforcementof an interior cross wall of a two storied building to carry 100mm thick RC slab with 3m ceiling height. The wall is unstiffened and it supports 2.65m wide slab. Live load on roof: 1.5kN/m^2 Live load on floor: 2.0kN/m^2 Weight of floor finish: 0.2kN/m^2 Weight of terrace: 2.0 kN/m^2	BT-5	Evaluating
2.	State the following terms: (i) Effective length of brick masonry wall. (ii) Effective height of brick masonry wall. (iii) Permissible stress in brick masonry. (iv) Lateral support to a wall.	BT-1	Remembering
3.	A brick masonry wall of a single room building is 20 cm thick and it is supported by 10 cm thick RC slab at its top and bottom. The wall carries a vertical load inclusive of its own weight of 80 kN/m at the base at an eccentricity ratio of 0.1. The length of the wall is 3 m between cross walls. The clear height of the storey is 3 m. Evaluate the required crushing strength of brick and type of mortar to be used.	BT-4	Analyzing
4.	Design an exterior wall of two storied building using nominal bricks of 230x100x75 mm. The wall supports R.C.C roof slab of 100mm thick. Clear height of each floor is 3m. C/C distance between cross wall is 2.8m and continuous along one direction only, effective width of slab supported by the wall is 1.7m. Live load from roof slab is 1.5N/m^2 and live load from slab is 2.5N/m^2.	BT-6	Creating

VALLIAMMAI ENGINEERING COLLEGE

DEPARTMENT OF CIVIL ENGINEERING

CE6601 – Design of Reinforced Concrete & Brick Masonry Structures

S.no	Subject		BT1	BT2	BT3	BT4	BT5	BT6	Total Question
1	Unit-1	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
		Part-C	1	-	-	1	1	1	4
2	Unit-2	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
		Part-C	1	-	-	1	1	1	4
3	Unit-3	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
		Part-C	1	1	-	1	-	1	4
4	Unit-4	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
		Part-C	1	-	-	1	1	1	4
5	Unit-5	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
		Part-C	1	-	-	1	1	1	4

TOTAL NO.OF QUESTIONS IN EACH PART

PART A	100
PART B	70
PART C	20
TOTAL	190

R.ANJUGHAP PRIYA **N.VINOTH KUMAR** **M.MURUGAN**