DIPLOMA IN CIVIL ENGINEERING

CENTRALIZED QUESTION BANK

4010640 - Computer Applications In Civil Engineering Practice

DIRECTORATE OF TECHNICAL

EDUCATION GOVERNMENT OF

TAMILNADU

DIPLOMA END SEMESTER / YEAR EXAMINATION – 2023

Course : Civil Engineering

Subject : Computer Applications In Civil Engineering Practice **QP Code :** 4010640

Time : 3 Hours **Date :** **Session:** **Max Marks:** 100

ANSWER THE FOLLOWING QUESTIONS

1) (i) A circular bar 3m long is subjected to an axial load of 50kN. Using a spreadsheet calculate the stress and elongation of the following bar diameters: 8mm, 10mm, 12mm, 16mm and 20 mm. Take E = $2x10^5$ N/mm^2.
Tabulate the results on a spreadsheet and generate a pdf.

(40 Marks)

(ii) Using suitable software package design and prepare detailed drawing and bar bending schedule for a simply supported two way slab
Slab dimension = 3 m x 4 m
Concrete Grade = M25
Steel Grade = Fe500
Clear cover = 20 mm
Slab thickness = 125 mm
Live Load = 2 kN/m^2
Dead Load = 4 kN/m^2
Self weight = 3.1 kN/m^2
Assume any other required data. (55 Marks)

2) (i) Using spreadsheet calculations check for stability of a masonry gravity dam of following dimensions. Take unit weights of masonry and water as 22 kN/m^3 and 9.8 kN/m^3 respectively. Take Coefficient of friction = 0.6.
Top width = 3 m
Bottom width = 6 m
Height of dam = 15 m
Height of Water = 13 m
Face of dam in contact with water is vertical
Tabulate the results on a spreadsheet and generate a pdf. (40 Marks)

(ii) Using suitable software package prepare detailed drawing with longitudinal sectional view, plan with top reinforcements and bottom reinforcements for a continuous one way slab
Overall Slab dimension = 15m x 4m
Beam spacing = 3m c/c
Width of wall support = 230 mm
Concrete Grade = M25
Steel Grade = Fe 500
Clear cover = 20 mm
Slab thickness = 125 mm
Exterior span main reinforcement = 10 mm dia. bars @ 100 mm c/c
Exterior span distribution reinforcement = 8 mm dia. bars @ 300 mm c/c
Interior span main reinforcement = 8 mm dia. bars @ 100 mm c/c
Interior span distribution reinforcement = 8 mm dia. bars @ 300 mm c/c
Assume any other required data.

(55 Marks)

3) (i) Using spreadsheet calculations find centre of gravity and moment of inertia about major axis (I_{xx}) of a channel section of following dimensions:
width of top flange = 200 mm
width of bottom flange = 200 mm
overall depth of section = 300 mm
thickness of the section (flange and web) = 20 mm
Present the results on a spreadsheet and generate a pdf.

(40 Marks)

(ii) Using suitable software package prepare detailed drawing and bar bending schedule for a two way slab restrained at all sides.
Slab dimension = 3m x 4m
Concrete Grade = M25
Steel Grade = Fe500
Clear cover = 20 mm
Slab thickness = 125 mm
Live Load = 2 kN/m^2
Dead Load = 4 kN/m^2
Self weight = 3.1 kN/m^2
Assume any other required data.

(55 Marks)

4) (i) Using spreadsheet calculations find moment of inertia about major axis (I_{xx}) and moment of inertia about minor axis (I_{yy}) of an I-section of following dimensions:
width of top flange = 100 mm
width of bottom flange = 100 mm
overall depth of section = 250 mm
thickness of the section (flange and web)= 25 mm
Present the results on a spreadsheet and generate a pdf.

(40 Marks)

(ii) Using suitable software package develop detailed drawing and bar bending schedule of a doubly reinforced continuous RC beam of size 300 mm x 600 mm with two 4 m long spans supported over three masonry walls of 300 mm thick. The beam is reinforced with 3 numbers of 16 mm diameter bars at bottom of the section and 2 numbers of 16 mm diameter bars at top of the section. 8mm diameter stirrups are placed at 150 mm c/c. The clear cover is 25 mm.

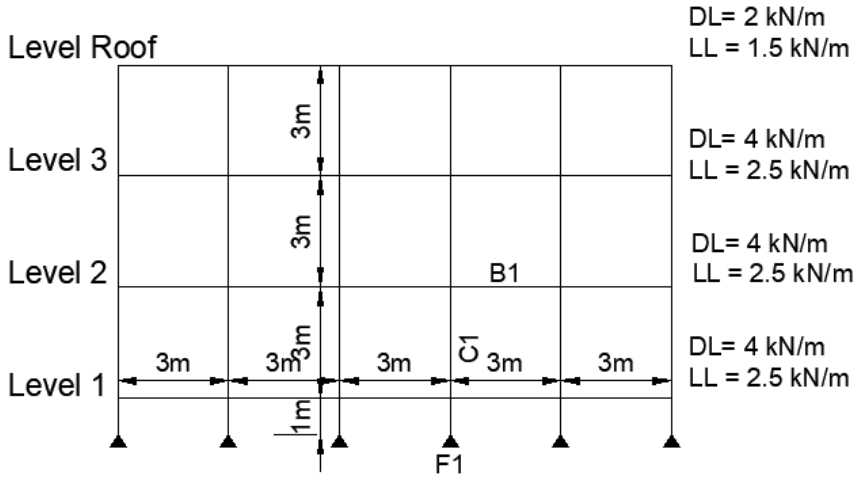
(55 Marks)

5) (i) Using spreadsheet calculations find centre of gravity and moment of inertia about horizontal axis passing through centroid (I_{xx}) of an angle section of following dimensions:
width of vertical leg = 250 mm
width of horizontal leg = 150 mm
thickness of the section (both legs)= 30 mm
Present the results on a spreadsheet and generate a pdf.

(40 Marks)

(ii) Using suitable software package develop a model of bay of RC beams and columns. The bottom of each column is hinged 1m below level 1 and each floor has a floor height of 3m. The spacing between columns is 3m c/c as shown in the figure below. The roof beams are loaded with UDL of 2kN/m dead load and 1.5 kN/m live load. Other floors are loaded with UDL of 4 kN/m dead load and 2.5 kN/m live load. Assume M25 grade concrete of all beams and columns and use Fe415 grade steel with 25 mm clear cover. Provided dead load excludes self-weight. Self-weight of members shall be auto calculated using the software itself. Assume any other data appropriately and analyse the model. Present reports on below items.

a) Shear force and bending moment diagram of beam B1
b) Reaction on foundation F1
c) Design of beam B1
d) Design of column C1



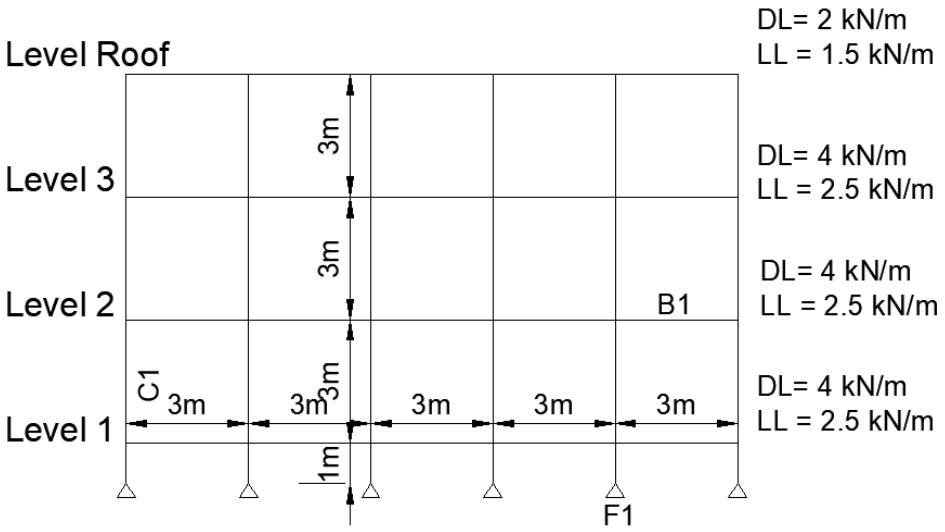
(55 Marks)

6) (i) A square bar 3m long is subjected to an axial load of 20kN. Using a spreadsheet calculate the stress and elongation of the following bar sizes: 8mm, 9mm, 10mm, 11mm and 12 mm. E = $2x10^5$ N/mm^2.Tabulate the results on a spreadsheet and generate a pdf.

(40 Marks)

(ii) Using suitable software package develop a model of bay made of RC beams and columns. The bottom of each column is hinged 1m below level 1 and each floor has a floor height of 3m. The spacing between columns is 3m c/c as shown in the figure below. The roof beams are loaded with 2kN/m dead load and 1.5 kN/m live load. Other floors are loaded with 4 kN/m dead load and 2.5 kN/m live load. Provided dead load excludes self-weight. Self-weight of members shall be auto calculated using the software itself. Assume M25 grade concrete of all beams and columns and use Fe415 grade steel with 25 mm clear cover. Assume any other data appropriately and analyse the model. Present reports on below items

a) Shear force and bending moment diagram of beam B1
b) Reaction on foundation F1
c) Design of beam B1
d) Design of column C1

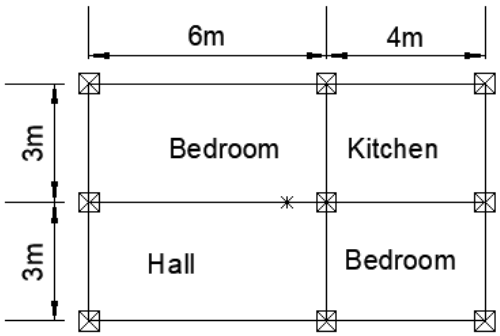


(55 Marks)

7) (i) Using spreadsheet calculations find the neutral axis of an RC beam 450 mm deep and 230 mm wide. The beam is made of M25 grade concrete and Fe500 steel. The beam is reinforced with 3 numbers of 16mm diameter bars at bottom of the section and 2 numbers of 16 mm diameter bars at top of the section. 8mm diameter stirrups are placed at 150 mm c/c. The clear cover is 25 mm.
Present the results on a spreadsheet and generate a pdf.

(40 Marks)

(ii) Using suitable software package prepare a 3D model of G+2 building with plan shown in below figure. Floor height is 3 m and footing level is 1 m below ground level. Take M25 grade concrete and Fe 500 grade steel for all members. Apply 3.5 kN/m^2 dead load and 2.0 kN/m^2 live load on all levels. Provided dead load excludes self-weight. Self-weight of members shall be auto calculated using the software itself. Assume appropriate sizes for all beams, columns and slabs. Assume any acceptable values for other data required to prepare and analyse the model. Design the members based on IS456:2000 and present design report for any one slab, beam and column.

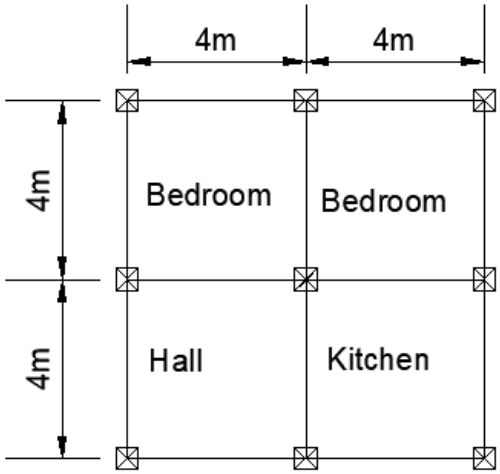


(55 Marks)

8) (i) A circular bar 2m long is subjected to an axial load of 70kN. Using a spreadsheet calculate the stress and elongation of the following bar diameters: 8mm, 10mm, 12mm, 16mm and 20 mm. Tabulate the results on a spreadsheet and generate a pdf.

(40 Marks)

(ii) Using suitable software package prepare a 3D model of G+2 building with plan shown in below figure. Floor height is 3 m and footing level is 1 m below ground level. Take M25 grade concrete and Fe 500 grade steel for all members. Apply 3.5 kN/m^2 dead load and 2.0 kN/m^2 live load on all levels. Provided dead load excludes self-weight. Self-weight of members shall be auto calculated using the software itself. Assume appropriate sizes for all beams, columns and slabs. Assume any acceptable values for other data required to prepare and analyse the model. Design the members based on IS456:2000 and present design report for any one slab, beam and column.



(55 Marks)