CBCS SCHEME

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15CV51

Fifth Semester B.E. Degree Examination, July/August 2021
Design of RC Structural Elements

Time: 3 hrs. Max. Marks: 80

Note: 1. ***Answer any FIVE full questions.***
2. ***Use of IS456-2000 and SP(16) are permitted.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

1 a. Write the difference between working stress method and limit state method. **(06 Marks)**

b. Derive an expression for area of stress block – $0.36f_{CK}X_u$ and depth of centre of compressive force from the extreme fibre in compression $0.42\ x_u$. **(10 Marks)**

2 a. What are the factors influences short term and long term deflection? **(06 Marks)**

b. Derive an expression of resistance of moment for a balanced section in terms of F_y and p. **(10 Marks)**

3 a. What are the differences between singly reinforced and doubly reinforced beam. **(06 Marks)**

b. Determine the moment of resistance (flexural). For the rectangular beam of size 250×450 mm consist of 4 bars of 18 mmϕ in tension zone.The beam is simply supported over a span of 5 m. Also determine the uniformly distributed load (UDL) which the beam can carry. Use M-20 concrete and Fe-415 steel. Assume clear cover is 40 mm. **(10 Marks)**

4 a. Determine moment of resistance for a cantilever beam 300×400 mm consist of 2 bars of 18mmϕ in bottom and 4 bars of 18 mmϕ in top. Use M20 concrete and Fe415 steel. **(06 Marks)**

b. Determine the moment of resistance of a T beam. The effective width of the flange is 2500 mm, depth of flange (D_F) 150 mm, width of the rib (B_W) is 300 mm and effective depth (d_f) is 800 mm. F_{CK} is 20 N/mm^2, F_y = 415 N/mm^2. Take area of steel is 6000 mm^2. **(10 Marks)**

5 Design a simply supported rectangular beam of clear span 5 m, supported on 230 mm thick wall. It is also subjected to an uniformly distributed load (UDL) 25 kN/m along with 10 kN point load at midspan. Use M20 concrete and Fe-415 steel. Design the beam for flexural and shear and also sketch the reinforcement details. **(16 Marks)**

6 A T-beam slab floor of an office comprises a slab of 150 mm thick spanning between ribs or webs of 250 mm wide spread at 3.2 m centre to centre. Clear span of beam is 7.7 m. The beam is 600 mm deep including slab and simply supported over a walls of 300 mm wide. Live load on floors 4 kN/m^2, floor and ceiling finishing is 0.75 kN/m^2. The beam also supports a partition wall which transmit a load of 12 kN/m. Design one of the intermediate beam for flexure and shear. Two main bars are to be bent near the support. Assume effective cover is 50 mm. **(16 Marks)**

7 Design a rectangular slab $4\text{m} \times 6\text{m}$ continuous over two adjacent edges to support a live load of 3 kN/m^2. Characteristic strength of concrete and steel is 20 and 415 N/mm^2. Use limit state method of design and sketch the reinforcement details. **(16 Marks)**

8 Design a open wall staircase for an residential building of a room size $4m \times 5.5m$. Take riser height 150 mm, thread 250 mm, floor to floor height is 3.6 m width of the stair is 1.5 m. Use M25 concrete and Fe500 steel. Also sketch the reinforcement details. **(16 Marks)**

9 Design a rectangular column 3.5 m long restrained in position and direction at both the ends to carry an axial load of 2000 kN. Use M25 concrete and Fe415 steel. Also draw the reinforcement pattern. **(16 Marks)**

10 Design a square footing for a square column of size $450 \times 450mm$ carrying a service load of 2000 kN. Take Safe Bearing Capacity of soil (SBC) is 300 kN/m^2 at a depth 1.5 m below ground level. Adopt M20 concrete and Fe415 steel. **(16 Marks)**

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15CV52

Fifth Semester B.E. Degree Examination, July/August 2021
Analysis of Indeterminate Structures

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions.***

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

1 Analyze the continuous beam shown in Fig. Q1 by slope deflection method. Draw BMD and Elastic curve. **(16 Marks)**

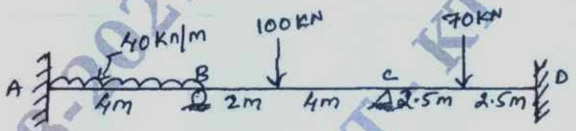

Fig. Q1

2 Analyze the portal Frame shown in Fig. Q2 by slope deflection method. Draw BMD. **(16 Marks)**

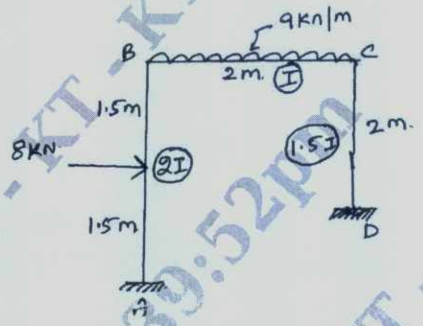

Fig. Q2

3 Analyze the continuous beam by moment distribution method shown in Fig. Q3. The support 'C' sinks by 9 mm. Take EI = 1000 kN-m^2. Draw BMD and Elastic curve. **(16 Marks)**

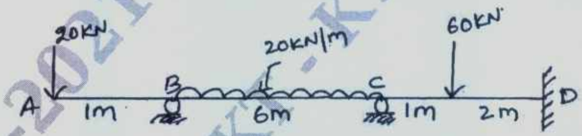

Fig. Q3

4 Analyze the portal frame shown in Fig. Q4 by moment distribution method. Draw BMD. **(16 Marks)**

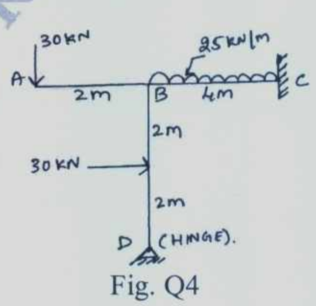

Fig. Q4

5 Analyze the continuous beam by Kani's method shown in Fig. Q5. Draw BMD. **(16 Marks)**

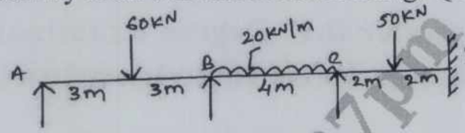

Fig. Q5

6 Analyze the portal frame shown in Fig. Q6 by Kani's method. Draw BMD. **(16 Marks)**

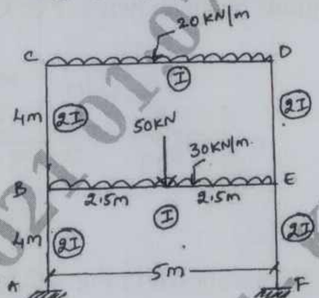

Fig. Q6

7 Analyze the beam shown in Fig. Q7 by flexibility matrix method. Draw BMD. **(16 Marks)**

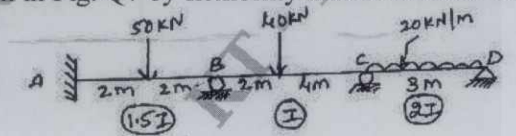

Fig. Q7

8 Analyze the portal frame shown in Fig. Q8 by flexibility matrix method. Draw BMD. **(16 Marks)**

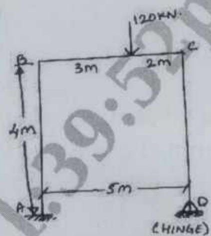

Fig. Q8

9 Analyze the continuous beam shown in Fig. Q9 by stiffness matrix method. Draw BMD. **(16 Marks)**

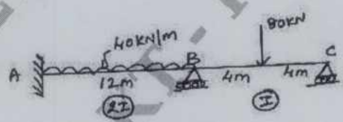

Fig. Q9

10 Analyze the portal frame shown in Fig. Q10 by stiffness matrix method. Draw BMD. **(16 Marks)**

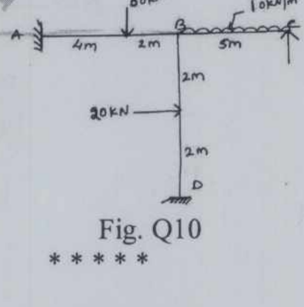

Fig. Q10

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15CV53

Fifth Semester B.E. Degree Examination, July/August 2021
Applied Geotechnical Engineering

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions.***

1 a. Determine the Area ratios for the following soil samplers and comment on the nature of samples obtained using each of the samplers.

i) Core cutter	165mm	OD	150mm ID
ii) Split barrel	51mm	OD	35mm ID
iii) Seamless tube (Shelby)	51mm	OD	48mm ID

(08 Marks)

b. What is borehole log? Give a typical bore hole log format. **(05 Marks)**

c. What are the objectives of dewatering? **(03 Marks)**

2 a. Explain briefly Seismic refraction method of geophysical method of exploration. **(06 Marks)**

b. With respect to a sampling tube, define i) Area ratio ii) Inside clearance iii) Outside clearance iv) Recovery ratio. **(06 Marks)**

c. What are the objectives of sub surface exploration? **(04 Marks)**

3 a. Define isobar. Using Boussinesq's equation construct isobar of intensity 0.25Q where Q is point load acting on the surface. **(08 Marks)**

b. Differentiate between Boussinesq's and Westergaurd's method of determination of stresses in soil. **(04 Marks)**

c. A circular area of 7.5metre in diameter on the ground surface carries a uniformly distributed load of $3kN/m^2$. Find the intensity of vertical pressure below the centre of the loaded area at a depth of 6m below ground level. **(04 Marks)**

4 a. The base of a tower consists of a equilateral frame, on the corners of which the three legs of the tower is supported. The total weight of the tower is 600kN, which is equally carried by all the three legs. Compute the increment in the vertical stress in the soil caused at a point 5m below one of the legs. **(06 Marks)**

b. Explain the construction and use of Newmark's chart with a Influence value of 0.005q. **(06 Marks)**

c. A normally consolidated clay settled by 2cm when the effective stress was increased from 100kPa to 200kPa. Calculate the settlement when the effective stress was increased to 400kPa. **(04 Marks)**

5 a. Explain with relevant diagrams earth pressure at rest, active earth pressure and passive earth pressure on retaining wall. **(06 Marks)**

b. A retaining wall with a smooth vertical back retains sand backfill for 6m. The backfill has a horizontal surface and has the following properties.
$c^1 = 0$, $\phi^1 = 28°$, $r = 16kN/m^3$ and $r_{sat} = 20kN/m^3$ water table is at a depth of 3m. Draw the earth pressure diagram. Determine the total active earth pressure on the retaining wall and find its point of application. **(10 Marks)**

6 a. Explain Fellenius method of determination of centre of critical slip circle of failure of slopes. **(06 Marks)**

b. Explain all the steps to determine the active earth pressure in coarse grained soil using Rankine's method. **(10 Marks)**

7 a. Differentiate between general shear, local shear and punching shear failure of soil. **(06 Marks)**

b. A ship footing 1.2m wide, is supported on a soil with its base at a depth of 1m below ground surface. The soil properties are as follows:
$C = 15kN/m^2$, $\phi = 35°$, $r_t = 18kN/m^3$ submerged unit weight $r^1 = 10kN/m^3$
Determine the ultimate bearing capacity if
i) Water table is at great depth.
ii) Water table is at the level of the base of the footing.
iii) The water table is at ground level.
Use Terzaghi's bearing capacity theorem. Bearing capacity factors $N_c = 57.8$, $N_q = 41.4$, $N_r = 42.4$ **(10 Marks)**

8 a. Explain the effect of water table on bearing capacity of soils. **(04 Marks)**

b. How plate load test results are correlated to find bearing capacity and settlement of foundations. **(06 Marks)**

c. A trapezoidal footing is to be proposed to support two square columns of 30cm and 50cm sides respectively. Columns are 6m apart and the safe bearing capacity of soil is $400kN/m^2$. The bigger column carries 5000kN and smaller 3000kN. Design a suitable size of the footing so that it does not extend beyond the faces of the columns. **(06 Marks)**

9 a. Give a brief description of classification of piles based on materials and function. **(10 Marks)**

b. What is negative skin friction in piles? Under what field conditions piles are subjected to negative skin friction. How it is estimated in different soils. **(06 Marks)**

10 a. Explain in detail the determination of load carrying capacity of piles using static formula. **(10 Marks)**

b. Give a brief description of group load carrying capacity of piles. **(06 Marks)**

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15CV561

Fifth Semester B.E. Degree Examination, July/August 2021
Traffic Engineering

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions.***

1 a. Define Traffic Engineering and explain its scope. **(08 Marks)**

b. What are the different Resistances to be considered in vehicle movement? Explain. **(08 Marks)**

2 a. Discuss the Road user characteristics in detail. **(08 Marks)**

b. A vehicle of mass 1800kg has to accelerate at 2m/sec^2 from a speed of 12kmph to 22kmph in the first gear. The gradient is +1.2% and the coefficient of rolling resistance is 0.025. The frontal area and coefficient of air resistance are 2.38m^2 and 0.37respectively. Determine the engine horse power required. **(08 Marks)**

3 a. List the objectives and uses of i) 'O' and 'D' studies ii) Parking studies. **(08 Marks)**

b. Discuss the various traffic studies and what are the objects of carrying out traffic volume studies. **(08 Marks)**

4 a. Mention the objectives of accident studies; also mention the various causes of accidents. **(08 Marks)**

b. A vehicle of weight 2.0 tonne skids through a distance equal to 40m before colliding with another parked vehicle of weight 1.0 tonne after equal to 12m before stopping. Compare the initial speed of the moving vehicle. Assume coefficient of friction as 0.5. **(08 Marks)**

5 a. Explain the following with examples :
i) Regulatory signs ii) Warming signs iii) Informatory signs. **(08 Marks)**

b. Explain at grade and grade separated inter section. **(08 Marks)**

6 a. Bring out the advantages and disadvantages of traffic signals. **(08 Marks)**

b. The average normal flow on cross roads 'A' and 'B' during design period are 400 and 250 PCU per hour. The saturation flows are 1250 and 1000 PCU per hour respectively. The all red time required for pedestrian crossing is 12 seconds. Design a two phase signal by Webster's method. **(08 Marks)**

7 a. Explain various design factors of road lighting. **(08 Marks)**

b. Discuss the effect of air pollutants. **(08 Marks)**

8 a. Explain the measures to control the traffic noise. **(08 Marks)**

b. Write a short notes on road safety audit. **(08 Marks)**

9 a. Explain : i) TSM ii) TDM. **(08 Marks)**

b. Mention the applications of ITS. **(08 Marks)**

10 a. Mention the basic principles of traffic regulation. **(08 Marks)**

b. Explain the factors determining skid resistance. **(08 Marks)**

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