CBCS SCHEME

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17CV/CT51

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Design of RC structural Elements

Time: 3 hrs. Max. Marks: 100

Note: *Answer FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Define characteristic strength of materials and characteristic loads with sketches. **(04 Marks)**

b. Distinguish between : (i) Balanced section, (ii) Under –reinforced section and (iii) Over reinforced section with sketches. Which section is preferable and why? **(10 Marks)**

c. Derive an expression for $\bar{y}$, the depth of centre of compressive force from the extreme compressive fiber for a singly reinforced rectangular beam section. **(06 Marks)**

OR

2 a. What are the assumption made in the limit state of design for collapse in flexure in singly reinforced beam section. **(04 Marks)**

b. A simply supported beam has a rectangular section of size 300mm × 650mm and carries a uniformly distributed load of 15 kN/m over a clear span of 5.5 m. It is reinforced with 4 bars of 25 mm diameter bar. Use M25 concrete and Fe 500 grade HYSD bars. Compute short and long term deflections of the beam. **(16 Marks)**

Module-2

3 a. A reinforced concrete Cantilever beam 2 m long and having cross section of size 240mm × 400mm is reinforced with 4 bars of 16 mm diameter at top on tension side. The beam is designed to support a concentrated load of 3 kN at the free end in addition to uniformly distributed load on it. Determine the permissible uniformly distributed load, the beam can carry on it. Use M20 grade concrete and Fe 415 grade steel. **(10 Marks)**

b. A doubly reinforced beam section is 300 mm wide and 500 mm deep to the centre of tensile reinforcement. It is reinforced with compression reinforcement of 300 mm^2 at an effective cover of 50 mm and tension reinforcement of 1800 mm^2. Determine the safe moment of resistance of the section. M20 grade concrete and Fe 500 grade steel is used. **(10 Marks)**

OR

4 a. A singly reinforced concrete slab 150 mm thick is reinforced with 10 mm diameter bars at 200 mm centres located at an effective depth of 125 mm. M20 grade concrete and Fe415 grade HYSD bars are used. Estimate the ultimate moment of resistance of the section. **(04 Marks)**

b. A rectangular RC section of size 300 × 600mm effective is reinforced with 4 bars of 25 mm diameter HYSD bar of grade Fe 415. Two of the tension bars are bent at 45° near the support section. The beam is provided with double legged vertical links of 8 mm diameter at 150 mm centres near supports. Using M-25 grade concrete, compute the ultimate shear strength of the support section. **(08 Marks)**

c. A simply supported T-beam of depth of 450 mm has a flange width of 1000 mm and depth of 120 mm. It is reinforced with 6 – 20 mm diameter bars on tension side with a clear cover of 30 mm. M20 grade concrete and Fe415 grade steel are used. Calculate moment of resistance of beam. Take, $b_w = 300$ mm. **(08 Marks)**

Module-3

5 a. Design a singly reinforced beam simply supported at its two ends for flexural reinforcement. The clear span of beam is 5.6 m, the intensity of uniformly distributed superimposed dead and live loads are 18 kN/m and 26 kN/m. Use M-25 grade of concrete and HYSD steel of Fe500 grade. The beam should meet the durability requirement for exposed conditions of 'Severe' atmospheric and fire resistance of one and half hour. **(08 Marks)**

b. Design a doubly reinforced rectangular beam of size 300mm × 600mm simply supported at both ends. Check for deflection need not be calculated. The effective span is 5.6 m. The beam carries a service imposed load of 24 kN/m and super imposed dead load of 16 kN/m. Use M20 grade of concrete and HYSD steel of Fe415 grade. **(12 Marks)**

OR

6 Design an intermediate T-beam for a hall measuring 6.5m × 12m (clear dimensions). Beams are spaced at 3 m C/C. Depth of slab is 150 mm. Super imposed live load on slab is 4.0 kN/m^2, finishes is 1.0 kN/m^2. Check for deflection also. Use M20 grade concrete and HYSD bar of Fe500 grade. Sketch the reinforcement details. **(20 Marks)**

Module-4

7 Design a slab for a class room of dimension 4m × 6m (supported on all the four edges) with two adjacent edges discontinuous. Live load = 3 kN/m^2, Floor finish = 1 kN/m^2; Bearing = 300 mm. Use M20 grade concrete and Fe500 grade steel. Check for deflection need not be done. **(20 Marks)**

OR

8 Design the two flight dog legged stair for a hall of dimension (clear) 3m × 5m between the floors. The floor to floor height is 3.2 m and rise is 160 mm. Also check for deflection. Use M20 grade concrete and Fe500 grade steel. Sketch the reinforcement details of one flight. **(20 Marks)**

Module-5

9 a. Design the necessary reinforcement for RC column 450mm × 600mm to carry an axial load of 2000 kN. The length of the column is 3.5 m. Use M25 grade concrete and Fe415 grade steel. Sketch the reinforcement details. **(10 Marks)**

b. A rectangular column 300 mm wide and 500 mm deep is subjected to an axial factored load of 1200 kN and a factored moment of 200 kN-m. Calculate the necessary reinforcement distributing equally on all four sides. Sketch the reinforcement details. Adopt M25 and Fe500 grade materials. **(10 Marks)**

OR

10 Design a square footing of flat type for a column of size 400mm × 400mm to carry an axial dead load of 800 kN and a live load of 1000 kN without any moment. Safe bearing capacity of soil is 180 kN/m^2. Adopt M20 grade concrete and Fe 500 grade steel. Sketch the footing showing the details of reinforcement. **(20 Marks)**

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CBCS SCHEME

USN

17CV52

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Analysis of Indeterminate Structures

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 Analyse the beam completely by slope deflection method relative to support A support B sinks by 1mm and support C rises by 0.5 mm. Take EI = 30000 kN-m2. Refer Fig.Q1. Draw BMD, SFD and Elastic curve.

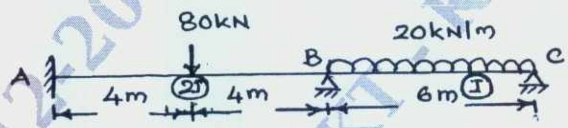

Fig.Q1 **(20 Marks)**

OR

2 Analyse the given frame by slope deflection method. Draw SFD, BMD and elastic curve. Refer Fig.Q2.

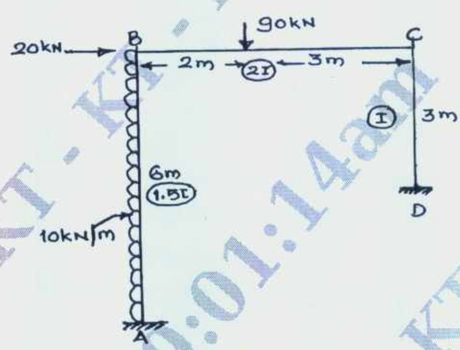

Fig.Q2 **(20 Marks)**

Module-2

3 Analyse the beam shown in Fig.Q3 by moment distribution method. Draw BMD, SFD and elastic curve.

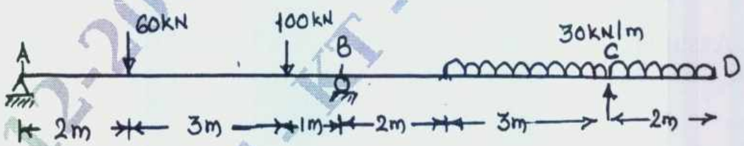

Fig.Q3 **(20 Marks)**

OR

4 Analyse the frame by moment distribution method. Draw BMD, SFD and elastic curve. Refer Fig.Q4.

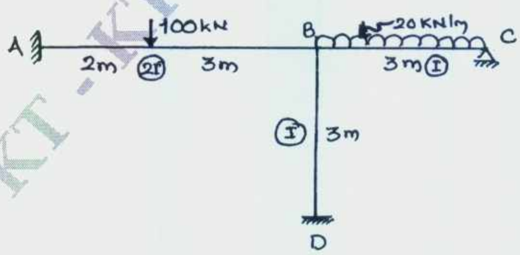

Fig.Q4

(20 Marks)

Module-3

5 Analyse the three span continuous beam shown in Fig.Q5 by using Kani's method. Draw BMD, SFD and elastic curve.

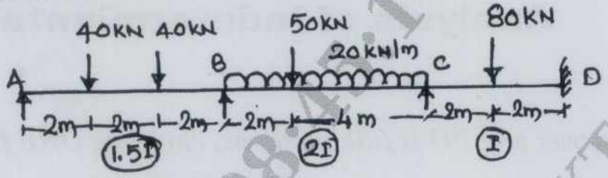

Fig.Q5

(20 Marks)

OR

6 Analyse the portal frames shown in Fig.Q6 by using Kani's method. Draw BMD, SFD and elastic curve.

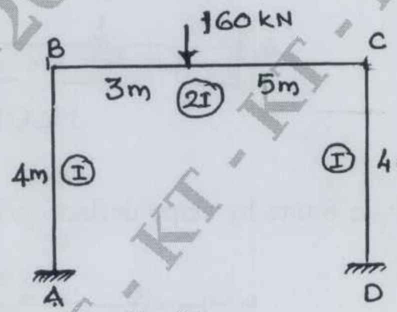

Fig.Q6

(20 Marks)

Module-4

7 Analyse the continuous beam shown in Fig.Q7 by flexibility method using system approach. Support B sinks by 5 mm sketch BMD, SFD and elastic curve. Take $EI = 15 \times 10^3$ kN-m^2.

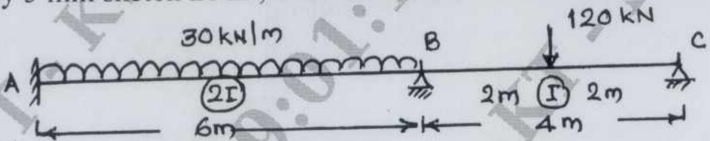

Fig.Q7

(20 Marks)

OR

8 Analyse the pin jointed plane truss shown in Fig.Q8 by using flexibility matrix method. Assume $\frac{L}{AE}$ for each member = 0.025 mm/kN. Tabulate the member forces.

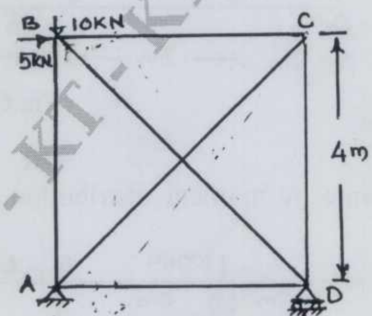

Fig.Q8

(20 Marks)

Module-5

9 Analyse the frame shown in Fig.Q9 by stiffness matrix method and draw BMD, SFD and Elastic curve. Assume EI is constant throughout.

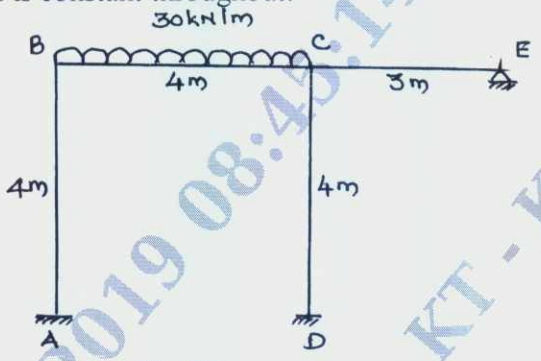

Fig.Q9 **(20 Marks)**

OR

10 Analyse the continuous beam shown in Fig.Q10 by using stiffness matrix method.

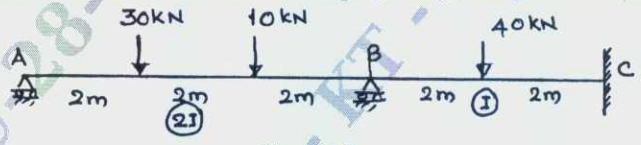

Fig.Q10 **(20 Marks)**

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17CV53

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Applied Geotechnical Engineering

Time: 3 hrs. Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS:6403 permitted.

Module-1

1 a. What are the objectives of soil exploration? **(06 Marks)**

b. With a neat sketch, explain seismic refraction method of soil exploration. **(08 Marks)**

c. What is the necessity of dewatering? Explain electro-Osmosis method of dewatering. **(06 Marks)**

OR

2 a. Define the following terms with reference to a sampling tube with a neat sketch:
i) Inside clearance
ii) Outside clearance
iii) Area ratio
iv) Recovery ratio. **(08 Marks)**

b. What is stabilization of bore holes? Explain any one method. **(06 Marks)**

c. List and explain types of soil samples. **(06 Marks)**

Module-2

3 a. Derive the equation for vertical stress below the centre of a circular area with uniform load intensity 'q'. **(08 Marks)**

b. Define Isobar. Construct an Isobar for a vertical stress of $40kN/m^2$, when ground surface is subjected to a concentrated load of 1000kN. **(08 Marks)**

c. Estimate the immediate settlement of a footing of size 2m × 3m resting at a depth of 2m in a sandy soil whose compression modulus is $10N/mm^2$ and the footing is expected to transmit a unit pressure of $160kN/m^2$. Assume $\mu = 0.28$ and $I_f = 1.06$. **(04 Marks)**

OR

4 a. Explain the construction and use of Newmark's chart. **(08 Marks)**

b. Explain contact pressure distribution in soils. **(06 Marks)**

c. A square footing 1.2m × 1.2m rests on a saturated clay layer 4m deep. The soil properties are $W_L = 30\%$, $\gamma_{sat} = 17.8kN/m^3$, $w = 28\%$ and $G = 2.68$. Determine primary consolidation settlement if the footing carries a load of 300kN. **(06 Marks)**

Module-3

5 a. Define with neat sketches at rest, active and passive earth pressures. **(06 Marks)**

b. Explain Culmann's graphical method of finding out the active earth pressure. **(06 Marks)**

c. A retaining wall retains a cohesionless backfill with a height of 7.5m. The top 3m of the backfill has unit weight of $18kN/Nm^3$ and $\phi = 30°$. Lower 4.5m of the backfill has unit weight of $24kN/m^3$ and $\phi = 20°$. Obtain pressure distribution diagram and determine the total active pressure and its point of application. **(08 Marks)**

OR

6 a. Explain Fellinious method of obtaining centre of critical slip surface in the case of stability analysis of C-ϕ soil. **(08 Marks)**

b. Explain the causes for slope failure and also list the type of slope failures. **(06 Marks)**

c. A 5m deep canal has side slopes of 1:1. The properties of soil are $C_u = 20$ kN/m^2, $\phi_u = 10°$, e = 0.80 and G = 2.8. If Taylor's stability number is 0.108, determine the factor of safety with respect to cohesion when the canal runs full. Also find the factor of safety in case of sudden draw down, if the Taylor's stability number for this condition is 0.137. **(06 Marks)**

Module-4

7 a. Define: Ultimate bearing capacity, net ultimate bearing capacity and safe bearing capacity. **(06 Marks)**

b. Explain plate load test with a neat sketch. **(08 Marks)**

c. A foundation 2.0m square is installed 1.2m below ground level in sandy soil having unit weight of 19.2kN/m^2 above water table and submerged unit weight of 10.1kN/m^3. If C = 0, and $\phi = 30°$, find ultimate bearing capacity when

i) Water table is well below the base of the foundation,

ii) Water table rises to foundation level,

iii) Water table rises to ground level.

Take $N_q = 22$ and $N_r = 20$. **(06 Marks)**

OR

8 a. Distinguish between general shear failure and local shear failure. **(06 Marks)**

b. Explain with a neat sketch the effect of ground water table and eccentricity on bearing capacity. **(08 Marks)**

c. How do you conduct SPT? What are the corrections applied to observed 'N' values? **(06 Marks)**

Module-5

9 a. Explain classification of piles based on function. **(06 Marks)**

b. Explain negative skin friction in pile foundation. **(06 Marks)**

c. Design a square pile group to carry 400kN of load in clay with an unconfined compressive strength of 60kN/m^2. The piles are 30cms diameter and 6m long. Adhesion factor may be taken as 0.6. **(08 Marks)**

OR

10 Write short notes on any four of the following:

a. Pile load test

b. Under reamed piles

c. Settlement of piles

d. Efficiency of pile group

e. Group capacity of piles. **(20 Marks)**

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CBCS SCHEME

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17CV/CT551

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Air Pollution and Control

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Classify the Air Pollution sources adding with examples. **(10 Marks)**

b. Describe the general mechanisms by which Air pollution effects the materials. **(10 Marks)**

OR

2 a. List out the types of Inversions and explain them. **(10 Marks)**

b. Elaborate Photochemical Smog adding, with chemical reactions. **(10 Marks)**

Module-2

3 a. With the aid of graphical representation, explain different types of stability conditions of atmosphere. **(10 Marks)**

b. Determine the plume rise and the effective height of the stack for the following data :

i) Physical stack height : 250m
ii) Inside diameter of stack at exit : 1m
iii) Wind velocity : 3m/sec
iv) Air temperature : 25^0C
v) Barometric pressure : 1000 millibars.
vi) Stack gas exit velocity : 10 m/sec
vii) Stack gas exit temperature : 150^0C. **(10 Marks)**

OR

4 a. A factory uses 1.5 million litres of fuel oil per month. The exhaust gases from the factory contain the following quantities of pollutants per million litres per year.

i) Particulate matter : 4t/year ii) SO_2 : 20t/yerar iii) NO_X : 5t/year
iv) HC , CO and others : 3t/year.

Determine the safe height of the chimney required for the safe dispersion of the pollutants. **(10 Marks)**

b. Write a note on measurement of the meteorological variables. **(10 Marks)**

Module-3

5 a. Explain the principles of sampling the gaseous air pollutants. **(10 Marks)**

b. Give step by step flow chart for the analysis of SO_X and NO_X. **(10 Marks)**

OR

6 a. With the aid of neat sketch, explain High Volume Air Sampler. **(10 Marks)**

b. Justify the necessity of isokinetic sampling in case of stack sampling. **(10 Marks)**

Module-4

7 a. Give the advantages and disadvantages of Wet Scrubbers. **(10 Marks)**

b. Explain the construction and working of settling chambers. **(10 Marks)**

OR

8 a. Elaborate the operating problems that are encountered while normal operation of fabric filters. (10 Marks)

b. A cement plant was emitting flue gas at the rate of 20000m^3/hr. Assuming inlet gas velocity of 2m/s, design a tubular ESP with 0.20m diameter with 7 cylinders to achieve the efficiency of i) 90% and ii) 95%. (10 Marks)

Module-5

9 a. Write a note on Noise Pollution causes, effects and control. (10 Marks)

b. Give the salient features of Environmental Protection Act, 1986. (10 Marks)

OR

10 a. Illustrate the case of Bhopal Gas Tragedy and its effects. (10 Marks)

b. Distinguish between Montreal Protocol and Kyoto Protocol. (10 Marks)

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17CV561

Fifth Semester B.E. Degree Examination, Dec.2019/Jan.2020
Traffic Engineering

Time: 3 hrs. Max. Marks: 100

Note: ***Answer FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Define traffic engineering and explain its scope. **(10 Marks)**

b. Explain the different resistances to be considered in vehicle movement. **(10 Marks)**

OR

2 a. In detail explain the road user characteristics. **(10 Marks)**

b. A vehicle of mass 1800 kg has to accelerate at 2 m/sec^2 from a speed of 12 KMPH to 22 KMPH in the first gear. The gradient is +1.2% and the co-efficient of rolling resistance is 0.025. The frontal area and co-efficient of air resistance are 2.38 m^2 and 0.37 respectively. Determine the engine horse power required. **(10 Marks)**

Module-2

3 a. List the objectives and uses of,
(i) Origin and destination studies.
(ii) Parking studies. **(10 Marks)**

b. Discuss the various traffic studies and what are the objects of carrying out traffic volume studies? **(10 Marks)**

OR

4 a. Write the objectives of accident studies, also mention the various causes of accidents. **(10 Marks)**

b. A vehicle of weight 2.0 tonnes skids through a distance equal to 40 m before colliding with another parked vehicle of weight 1.0 tonne, after equal to 12 m before stopping. Compare the initial speed of the moving vehicle. Assume co-efficient of friction as 0.5. **(10 Marks)**

Module-3

5 a. Explain the following with examples,
(i) Regulatory signs.
(ii) Warning signs.
(iii) Informatory signs. **(10 Marks)**

b. Briefly explain at grade and grade separated inter section. **(10 Marks)**

OR

6 a. List the advantages and disadvantages of traffic signals. **(10 Marks)**

b. The average normal flow on cross roads 'A' and 'B' during design period are 400 PCU and 250 PCU per hour. The saturation flows are 1250 PCU 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. **(10 Marks)**

Module-4

7 a. Explain various design factors of road lighting. **(10 Marks)**

b. Discuss the effect of air pollutants. **(10 Marks)**

OR

8 a. Explain the measures to control the traffic noise. **(10 Marks)**

b. Write short notes on road safety audit. **(10 Marks)**

Module-5

9 a. Explain (i) TSM (Traffic System Management)
(ii) TDM (Traffic Demand Management) **(10 Marks)**

b. What are the applications of ITs? **(10 Marks)**

OR

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

b. Explain the factors determining skid resistance. **(10 Marks)**

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