

CBCS SCHEME

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17CV/CT51

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021 Design of RC Structural Elements

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Use of IS 456-2000 and SP-16 is permitted.*

Module-1

- 1 a. Explain balanced section, over reinforced section and under reinforced section. (06 Marks)
b. Derive the expression for limiting steel and find limiting percentage steel for M20 concrete and Fe415 steel. (06 Marks)
c. A doubly reinforced rectangular beam 250×550 mm reinforced with 4-22mm diameter in tension 2-16mm diameter in compression E cover 50mm E span 12m Fe 415 steel. Check the deflection using modification factors. (08 Marks)

OR

- 2 a. Explain working stress method and limit state method of design. (06 Marks)
b. Explain the philosophy of structural design. (06 Marks)
c. Derive the expression for stress block parameters of compressive force C and its CG dist \bar{Y} . (08 Marks)

Module-2

- 3 a. A singly reinforced beam $250\text{mm} \times 500\text{mm}$ is reinforced with 4-16mm diameter E-Cover 50mm E span 6m. Determine the central point load that can be applied at mid span adopt M20 concrete Fe 500 steel. (10 Marks)
b. Find the steel for a rectangular section $300\text{mm} \times 600\text{mm}$ to support a load of 80kN/m E-span 6m E-Cover 50mm adopt M20 concrete Fe 415 steel. (10 Marks)

OR

- 4 a. A doubly reinforced concrete beam 250×450 mm is reinforced with 4-20mm diameter in comp 6-20mm diameter in tension. Find ultimate moment take E cover 50mm adopt M20 concrete Fe415 steel. (10 Marks)
b. A T beam has a flange width 1200mm flange thickness 100mm E depth 600mm web 300mm. Find steel to support ultimate moment 700kN m adopt M20 concrete Fe510 steel. (10 Marks)

Module-3

- 5 Design a beam having clear span 5m supporting a love load 10kN/m for flexure and shear. Apply the check for deflection and bond. Adopt M20 concrete Fe415 steel. (20 Marks)

OR

- 6 A rectangular beam $250\text{mm} \times 500\text{mm}$ to support a load 40kN/m including self wt (working load) E-span 5m E-cover 50mm. Design the beam for flexure and shear and apply check for deflection and bond. (20 Marks)

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.

Module-4

- 7 Design a two way slab for a room $6\text{m} \times 4\text{m}$ wall thickness 230mm. All edges discontinuous and corners are held down live load 4kN/m^2 floor finish 1kN/m^2 thickness of slab 150mm adopt M20 concrete Fe415 steel. (20 Marks)

OR

- 8 An open well stair case is to be provided for a stair hall $3.25\text{m} \times 3.25\text{m}$. The size of open well at centre $1.25\text{m} \times 1.25\text{m}$ Floor height 3.6m size of landing at each corner is $1\text{m} \times 1\text{m}$ thickness of stair wall 230mm. The stair slab is embedded into wall by 200mm live load 3kN/m^2 design the stair. (20 Marks)

Module-5

- 9 a. An axially loaded RCC column un supported length 2.75m has to carry an axial load 2000kN design a square section column. (12 Marks)
b. Design a column using SP-16 having a section $300\text{mm} \times 400\text{mm}$ subjected to ultimate load 1200kN ultimate moment $M_u = 200\text{kN m}$. Take effective cover 50mm. Assume steel on two sides only. (08 Marks)

OR

- 10 A square column 400mm sides carries a load of 900kN. Design footing SBC of soil 100kN/m^2 adopt M20 concrete Fe415 steel. Apply the check for one way shear and two way shear and bond. Assume depth of edges 300mm (Isolated footings). (20 Marks)

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17CV52

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021 Analysis of Indeterminate Structures

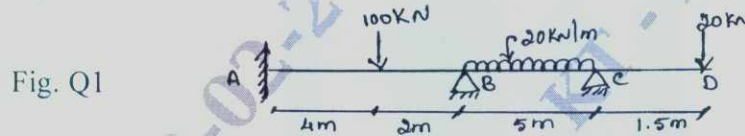
Time: 3 hrs.

Max. Marks: 100

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

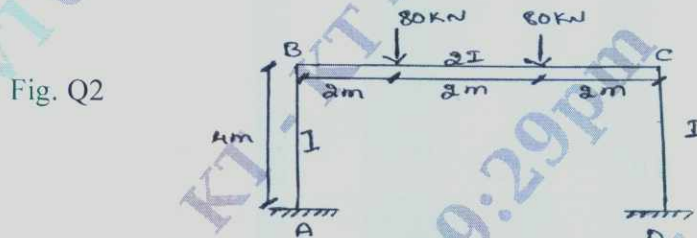
Module-1

- 1 Analyze continuous beam shown in Fig. Q1, by Slope deflection method. Draw Bending Moment diagram. Take EI constant. (20 Marks)



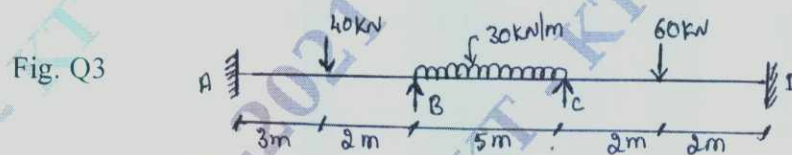
OR

- 2 Analyze the Portal frame shown in Fig. Q2, by Slope Deflection method. Draw bending moment diagram. (20 Marks)



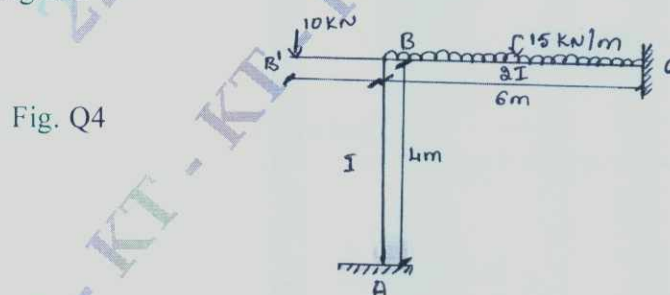
Module-2

- 3 Analyze Continuous beam shown in Fig. Q3, by Moment Distribution method. Draw Bending Moment diagram. Take EI constant. (20 Marks)



OR

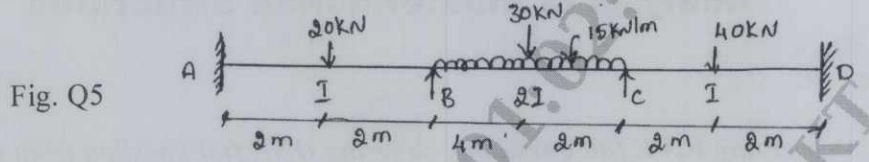
- 4 Analyze Portal frame shown in Fig. Q4, by Moment Distribution method. Draw Bending Moment diagram. (20 Marks)



Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
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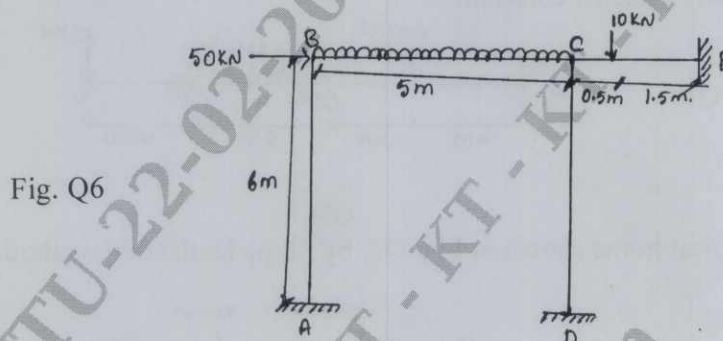
Module-3

- 5 Analyze the Continuous beam shown in Fig. Q5, by Kani's method. Draw Bending Moment diagram. (20 Marks)



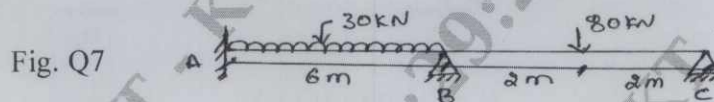
OR

- 6 Analyze the frame shown in Fig. Q6, by Kani's method. Draw Bending Moment diagram. (20 Marks)



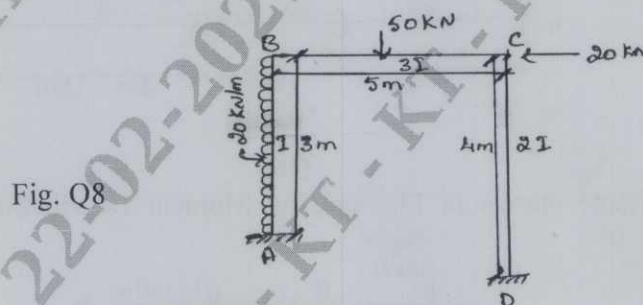
Module-4

- 7 Analyze the beam shown in Fig. Q7, by Flexibility Matrix method. Draw Bending Moment diagram. (20 Marks)



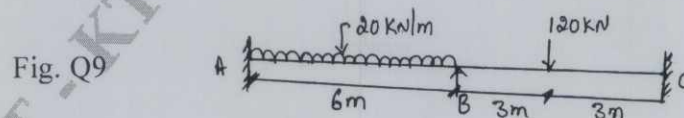
OR

- 8 Analyze Portal frame shown in Fig. Q8, by Flexibility Matrix method. Draw Bending Moment diagram. (20 Marks)



Module-5

- 9 Analyze the beam shown in Fig. Q9, by Stiffness Matrix method. Draw Bending Moment diagram. (20 Marks)



OR

- 10 Analyze Portal frame shown in Fig. Q10, by Stiffness Matrix method. Draw Bending Moment diagram. (20 Marks)

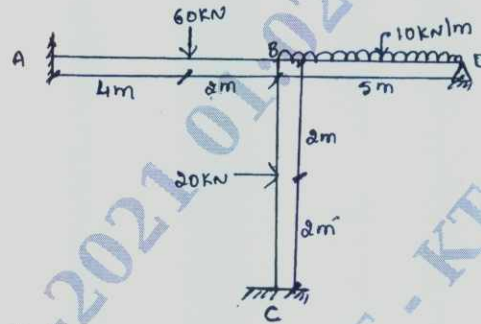


Fig. Q10

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17CV53

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021 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. Enumerate the objectives of soil investigation. (06 Marks)
b. Explain the wash boring method of soil exploration with a neat sketch. (07 Marks)
c. With a neat sketch of soil sampler, define:
i) Area ratio ii) Inside clearance iii) Outside clearance iv) Recovery ratio. (07 Marks)

OR

- 2 a. Distinguish between disturbed, undisturbed and representative samples, for which type of test the samples are suited. (06 Marks)
b. What is meant by drainage and dewatering? Explain electro-osmosis method of dewatering. (07 Marks)
c. Explain the Hvorslev's method of locating the ground water table. (07 Marks)

Module-2

- 3 a. Distinguish between Boussinesq and Westergaard's theory of stress distribution. (06 Marks)
b. Explain equivalent point load method of determining vertical stress at a point within loaded area. (07 Marks)
c. A load of 1000kN acts as a point load at the ground surface. Estimate the stress at a point 2m below and 4m away from the point of action of the load by Boussinesq's formula. Compare with Westergaard's formula. (07 Marks)

OR

- 4 a. A concentrated load 1000kN acts at the ground surface. Construct a 25% isobar. (06 Marks)
b. Explain the construction and use of Newmark's chart. (07 Marks)
c. A saturated clay 8m thick underlies a proposed new building. The existing overburden pressure at the centre of clay layer is 300kPa and load due to the new building increases the pressure by 200kPa. The liquid limit of the soil is 75%, water content = 50% and $G = 2.7$. Estimate the consolidation settlement. (07 Marks)

Module-3

- 5 a. Distinguish between active and passive earth pressure. What are the assumptions made in the Rankine's earth pressure theory? (06 Marks)
b. Explain the Culmann's graphical method of determining the active Earth pressure. (07 Marks)
c. A Smooth vertical wall of height 4.5m retains a cohesion less backfill with $\phi = 30^\circ$, void ratio = 0.62 and $G = 2.7$. If the soil is completely dry, draw the earth pressure distribution on the wall. If the water table rises to the top of the soil, compute the total earth pressure on the wall. (07 Marks)

OR

- 6 a. Explain the causes for a slope failure. Explain with neat sketch the different modes of slope failure. (06 Marks)
- b. Explain the method of slices for slope stability analysis. (07 Marks)
- c. Calculate the factor of safety with respect to cohesion of clay, the slope laid at 1 in 2 to a length of 11m. If the angle of internal friction $\phi = 10^\circ$, Taylor's stability number is 0.064, $c = 20\text{kN/m}^2$ and $\gamma = 19\text{kN/m}^2$. Determine the critical height of the slope. Determine the critical height of the slope in this soil. (07 Marks)

Module-4

- 7 a. What are the assumptions made in Terzaghi's theory? Write the expression for ultimate bearing capacity of strip footing, square and circular footing. (10 Marks)
- b. The footing of a column $2.5 \times 2.5\text{m}$ is founded at a depth of 1.5m on a cohesive soil of unit weight 18kN/m^3 . Take $C = 30\text{kN/m}^2$, $\phi = 0$. What is the safe load for this footing? (10 Marks)

OR

- 8 a. With the help of neat sketch, explain the effect of water table on the bearing capacity of soil. (10 Marks)
- b. Explain standard penetration test with suitable corrections. How do you access b.c. of shallow footings on sand using SPT test data? (10 Marks)

Module-5

- 9 a. List and explain the classification of piles based on function and material. (10 Marks)
- b. A square pile group of 9 piles of 250mm diameter is arranged with a pile spacing of 1m. The length of the pile is 9m. The unit cohesion of clay is 75kN/m^2 . Neglecting bearing at the tip of the piles. Determine the group capacity. Assume adhesion factor of 0.75ϕ . (10 Marks)

OR

- 10 a. Write a note on negative skin friction. (10 Marks)
- b. Write a note on under-reamed piles. How can the ultimate load carrying capacity of under-reamed piles can be estimated. (10 Marks)

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17CV/CT551

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021 Air Pollution and Control

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Draw neat sketches wherever necessary.

Module-1

- 1 a. Define air pollution. Explain the classification and properties of air pollution. (10 Marks)
b. Explain photochemical smog and Bhopal gas tragedy also explain causes of its. (10 Marks)

OR

- 2 a. Define inversion. Briefly explain the different types of inversion with neat sketch. (10 Marks)
b. List the meteorological factors influencing air pollution. (10 Marks)

Module-2

- 3 a. With a neat sketch, explain different types of environmental lapse rate. (10 Marks)
b. Explain the term Environmental Lapse Rate (ELR), Adiabatic Lapse Rate (ALR) and wind rose. (10 Marks)

OR

- 4 a. Explain preliminary considerations and stages of sampling. (10 Marks)
b. Write a brief procedure for collection of gaseous air pollutants from the ambient atmosphere. (10 Marks)

Module-3

- 5 a. Estimate the effective height of stack with the following data :
i) Physical stack height = 150m
ii) Inside diameter of stack of exit = 1.5m
iii) Wind velocity = 2.5m/sec
iv) Air temperature = 20°C
v) Pressure = 1000 milli bars
vi) Stack gas velocity = 8m/sec
vii) Stack gas temperature = 130°C. (10 Marks)
b. Briefly explain any one method of measuring SO₂ in the stack. (10 Marks)

OR

- 6 a. Explain with neat sketches the principle and working of the following :
i) Cyclone separator
ii) Electrostatic precipitators. (10 Marks)
b. Explain the advantages and disadvantages of scrubbers and fabric filters. (10 Marks)

Module-4

- 7 a. Define particulate matter and gaseous pollutants. Explain the working principle of settling chambers. (12 Marks)
b. Enumerate the various analytical methods available for monitoring of ambient and stack. (08 Marks)

OR

- 8 a. How automobile emission are controlled. (10 Marks)
b. Explain briefly the emission of the gasoline driven vehicles and diesel driven vehicles. (10 Marks)

Module-5

- 9 a. Define noise pollution. Explain sources and effects of noise pollution. (10 Marks)
b. Write brief note on indoor air pollution. (10 Marks)

OR

- 10 Write brief note on : (20 Marks)
a. Ambient air quality standards
b. Environmental Acts
c. Acid rain and its effects
d. Kyoto protocol
e. Global warming.

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17CV561

Fifth Semester B.E. Degree Examination, Jan./Feb. 2021 Traffic Engineering

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Assume any missing data suitably.

Module-1

- 1 a. List the different road users characteristics and explain the concept of PIEV theory. (10 Marks)
b. Explain the fundamentals of traffic flow. (10 Marks)

OR

- 2 a. What are the different vehicular characteristics which affect road design and explain briefly? (10 Marks)
b. Discuss various urban traffic problem that India is facing. List some remedial measures also. (10 Marks)

Module-2

- 3 a. List out the objectives of traffic volume studies and origin destination studies. (10 Marks)
b. Following data were obtained from the spot speed studies. Determine:
i) Upper and lower values of speed limit for regulation
ii) Design speed for checking the geometric design element of the highway.

Speed range (kmph)	Number of vehicles	Speed range (kmph)	Number of Vehicles
5 to 10	230	30 to 35	430
10 to 15	375	35 to 40	290
15 to 20	500	40 to 50	110
20 to 25	680	50 to 60	25
25 to 30	525	60 to 70	8

(10 Marks)

OR

- 4 a. Explain briefly speed and delay study by moving car method. (10 Marks)
b. From the following data determine:
i) Speed limit values for mixed traffic
ii) Speed for geometric design

Speed (kmph)	Frequency	Speed (kmph)	Frequency
0 to 10	12	50 to 60	225
10 to 20	18	60 to 70	119
20 to 30	68	70 to 80	43
30 to 40	89	80 to 90	33
40 to 50	204	90 to 100	9

(10 Marks)

Module-3

- 5 a. Enumerate the design factors and advantages of rotary intersection. (10 Marks)
b. Write short notes on: i) At-grade intersection ii) Channelized intersection. (10 Marks)

OR

- 6 a. What are the advantages and disadvantages of traffic signal? (10 Marks)
b. The average normal flow of traffic on cross roads A and B during design period are 410 and 260 pcu per hour. The saturation flows are 1260 and 1000 pcu per hour respectively. The all red time required for pedestrian crossing is 12 seconds. Design a two phase traffic signal by Webster's method. (10 Marks)

Module-4

- 7 a. Briefly explain the various causes of accidents. (10 Marks)
b. Explain various design factors of highway lighting. (10 Marks)

OR

- 8 a. Explain the measure to control the traffic noise. (10 Marks)
b. Explain briefly promotion of non-motorized transport. (10 Marks)

Module-5

- 9 a. Explain intelligent transport system for traffic management. (10 Marks)
b. Discuss the details of traffic system management. (10 Marks)

OR

10 Write short notes on the following:

- a. Traffic Congestion
b. Road Pricing System
c. Travel Demand Management
d. Traffic Regulatory Measures.

(20 Marks)
