CBCS SCHEME

15CV51

USN

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

Time: 3 hrs. Max. Marks: 80

Note: 1. *Answer any FIVE full questions, choosing ONE full question from each module.*
2. *Assume any missing data suitably*
3. *IS 456 : 2000 and SP -16 are allowed.*

Module-1

1 a. Explain the following with sketch. (06 Marks)
(i) Characteristics load (ii) Characteristics strength (iii) Partial safety factors.

b. Enumerate various limit states to be considered in design and explain briefly. (04 Marks)

c. With neat sketch of stress – strain Diagram write the assumptions made in limit state designing. (06 Marks)

OR

2 a. What is Stress block? Derive expression for stress block parameters. (06 Marks)

b. Explain briefly about balanced, under reinforced and over reinforced sections with strain Diagram. (04 Marks)

c. Explain: i) Short term deflection ii) long-term deflection iii) Slenderness limits for beam lateral stability. (06 Marks)

Module-2

3 a. Differentiate between singly reinforced and doubly reinforced beams, and list the situation in which doubly reinforced section are used. (04 Marks)

b. A rectangular Reinforced concrete beam of size 300mm × 550mm is simply supported over an effective span of 7mtr, is reinforced with 4 bars of 20mm diameter. Determine maximum super imposed UDL which can be carried by beam apart from its self weight, and also find area of tension steel to be modified to make section an balanced section. Use M20 grade concert and Fe 415 steel. Assume effective cover for tension steel 50mm. Density of RCC 25kN/m^3. (12 Marks)

OR

4 a. Write the expressions for moment resisting capacity of flanged sections for various cases of Neutral axis depth with respect to Depth of Flange. (06 Marks)

b. A rectangular beam is 250mm wide and 500mm deep, is reinforced with 3 bars of 20mm dia bars in compression zone. Determine the area of tension reinforcement needed to make the section fully effective. Also find the moment of resistance of section. Assume M20 Grade concrete and Fe 415 steel, cover for reinforcement is 50mm. (10 Marks)

Module-3

5 a. Brief about codal provisions made in providing longitudinal and lateral reinforcement in beams. (04 Marks)

b. A simply supported rectangular beam is supported on 300mm wide walls, over a clear span of 6mtrs. Design the beam by using M25 grade concrete and Fe 415 Grade steel. Superimposed load on beam is 15kN/m and breadth of beam is 230mm. (12 Marks)

OR

6 a. What is Torsion? Write expression for equivalent bending moment and equivalent shear force for members subjected to torsion. **(03 Marks)**

b. A T-beam slab floor has 125mm thick slab forming a part of T-beam. The end bearing are 450mm wide. Clear span is 8m. Spacing of T-beam is 3.5m clear. Live load on floor is 3kN/m^2 Design an intermediate beam. Use M20 Grade concrete and Fe 415 steel. **(13 Marks)**

Module-4

7 a. What is Development length? Write expression for Development length of MS and HYSD bars. **(04 Marks)**

b. Design a cantilever balcony slab having projection of 1.25mtr from beam face. Consider live load on slab 3kN/m^2 and floor finish 1kN/m^2. Use M20 grade concrete and Fe 415 steel. Calculate the development length of main steel to be embedded. **(12 Marks)**

OR

8 a. Differentiate between one way and two way slab, and mention codal provisions for steel reinforcement in slabs. **(03 Marks)**

b. Design two way slab for a room of size 4m × 5m. The slab is simply supported over 300mm thick wall. Live load and floor finish on slab is 4kN/m^2 and 1kN/m^2 respectively. Corners are held Down. Use M20 Grade concrete and Fe 415 Grade steel. **(13 Marks)**

Module-5

9 a. What are the codal provision to design longitudinal and lateral reinforcement for columns. **(06 Marks)**

b. A RC column of size 300mm × 400mm is 5 mtrs long is effectively held and restrained against rotation at both ends subjected to an ultimate load of 1100kN and ultimate moment of 150kN-m about major axis. Design column by using SP -16 for 2 side and 4 side reinforcement arrangement. Use M25 Grade concrete and Fe415 steel. **(10 Marks)**

OR

10 Design a RC Footing for column size 400mm × 400mm, which carries a maximum load of 800kN. SBC of soil is 200kN/m^2, If one side of footing is to be restricted to 1.50 mtr. Use M20 grade concrete and Fe 415 Grade steel. **(16 Marks)**

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CBCS SCHEME

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15CV52

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

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 Analyse the continuous beam shown in Fig Q1 by slope deflection method. Draw bending moment diagram and shear force diagram.

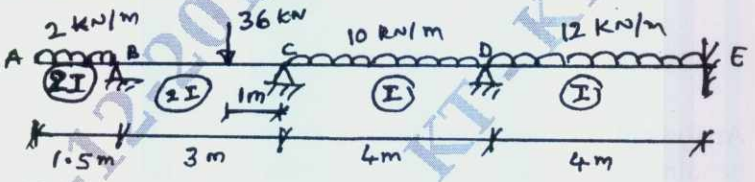

Fig Q1 **(16 Marks)**

OR

2 Analyse the portal frame shown in Fig Q2 by slope deflection method. Draw bending moment diagram.

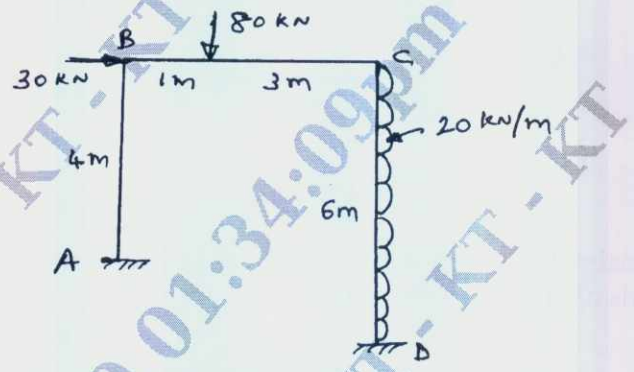

Fig Q2 **(16 Marks)**

Module-2

3 Analyse the continuous beam shown in Fig Q3 by moment distribution method. Draw bending moment diagram and shear force diagram. Support at B sinks by 10mm.

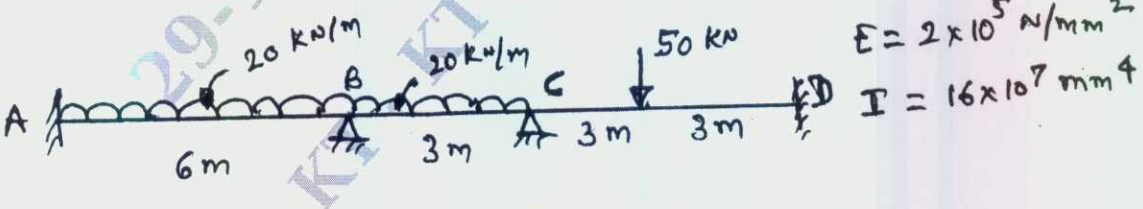

Fig Q3 **(16 Marks)**

OR

4 Analyse the frame shown in Fig Q4 by moment distribution method. Draw bending moment diagram.

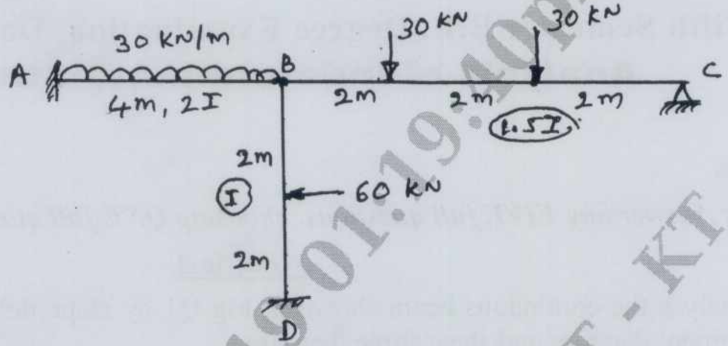

Fig Q4 **(16 Marks)**

Module-3

5 Analyse the continuous beam shown in Fig Q5 by rotation contribution method. Draw bending moment diagram and shear force diagram.

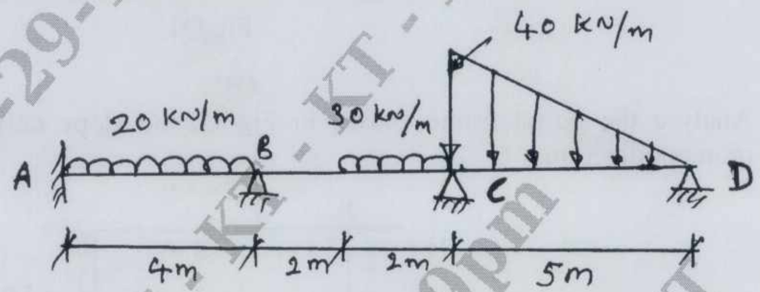

Fig Q5 **(16 Marks)**

OR

6 Analyse the frame shown in Fig Q6 by Kani's method. Draw bending moment diagram. Use axis of symmetry approach.

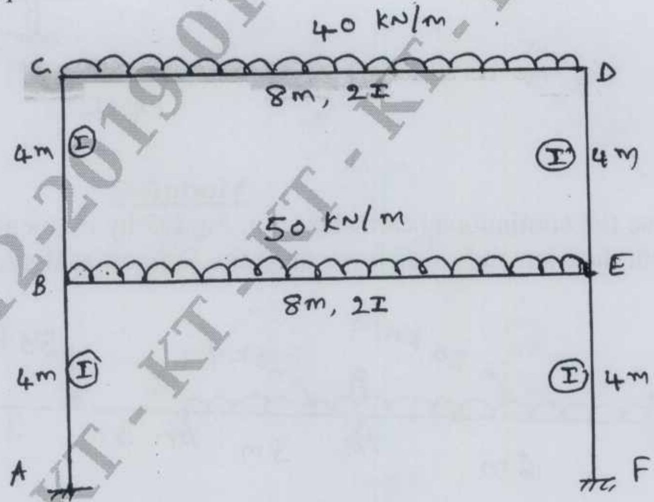

Fig Q6 **(16 Marks)**

Module-4

7 Analyse the continuous beam shown in Fig Q7 by flexibility matrix method. Draw BMD and SFD.

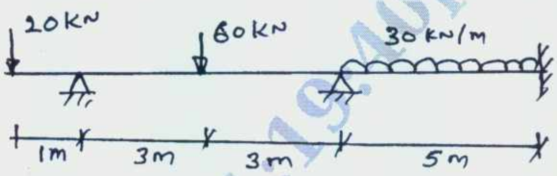

Fig Q7

(16 Marks)

OR

8 Analyse the pin jointed plane shown in Fig Q8 by flexibility matrix method to compute axial forces in the members. Assume $\frac{L}{AE}$ for each member is 0.025mm/kN.

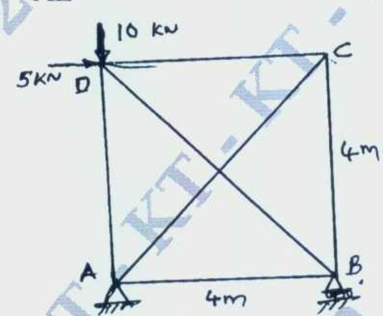

Fig Q8

(16 Marks)

Module-5

9 Analyse the continuous beam shown Fig Q9 by stiffness matrix method. Draw SFD and BMD.

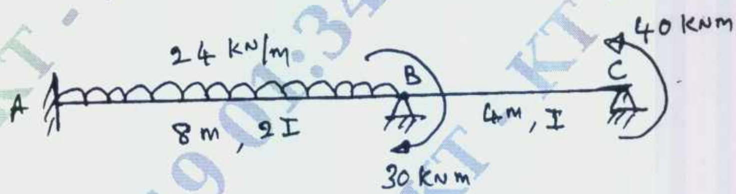

Fig Q9

(16 Marks)

OR

10 Analyse the portal frame shown in Fig Q10 by stiffness matrix method. Draw bending moment diagram.

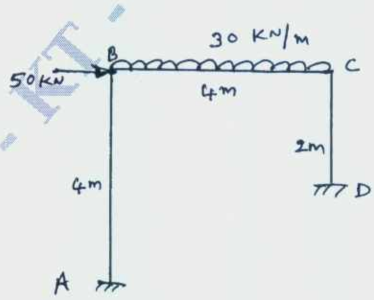

Fig Q10

(16 Marks)

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15CV53

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

Time: 3 hrs. Max. Marks: 80

Note: 1. *Answer FIVE full questions, choosing one full question from each module.*
2. *Missing data may be assumed suitably.*
3. *Use of IS:6403 is 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.

Module-1

1 a. List and explain various objectives of subsurface exploration. **(03 Marks)**

b. What is Borehole Log? With an example, state the details of exploration to be enclosed in Borehole log. **(04 Marks)**

c. Explain with neat diagram, any three methods of dewatering. **(09 Marks)**

OR

2 a. What are the objectives of Dewatering? Explain. **(03 Marks)**

b. The inner diameters of a sampling tube and that of a cutting edge are 70 mm and 68 mm respectively, their outer diameters are 72 mm and 74 mm respectively. Determine the inner clearance, outside clearance and area ratio of the sampler. **(04 Marks)**

c. What are the Geophysical methods of subsoil exploration? Explain in detail seismic refraction method. **(09 Marks)**

Module-2

3 a. What are the assumptions made in Boussinesq's analysis to determine the stresses in soil? **(03 Marks)**

b. A concentrated load of 22.5 kN acts on the surface of a homogenous soil mass of large extent. Find the stress intensity at a depth of 15 m and
(i) Directly under the load.
(ii) At a horizontal distance of 7.5 m.
Use Boussinesq's analysis. **(06 Marks)**

c. Explain the stress distribution on a vertical plane due to point load from Boussinesq's theory. **(07 Marks)**

OR

4 a. What is Newmarks's chart? Explain with neat diagram, the construction of Newmarks chart with influence value of 0.005q. **(08 Marks)**

b. Explain contact pressure diagram in different soils for different types of footings. **(04 Marks)**

c. A soft, normally consolidated clay layer is 18 m thick. The natural water content is 45%. The saturated unit weight is 18 KN/m^3, the grain specific gravity is 2.70 and the liquid limit is 63%. The vertical stress increment at the centre of the layer due to foundation load is 9 KN/m^2. The ground water is in level at the surface of clay layer. Determine the settlement of foundation. **(04 Marks)**

Module-3

5 a. Differentiate between active earth pressure and passive earth pressure on a retaining wall. **(04 Marks)**

b. Explain different types of finite slope failures. **(04 Marks)**

c. A gravity retaining wall retains 12 m of a back fill. r = 17.7 KN/m^3, $\phi = 25°$ with a uniform horizontal surface. Assume that wall interface to be vertical, determine the magnitude and point of application of total active earth pressure. If the water table is at a height of 6 m, how do the magnitude and point of application of total active earth pressure change. Submerged unit weight of soil = 10 kN/m^3. **(08 Marks)**

OR

6 a. List the assumptions made in Rankine's theory to determine lateral earth pressure in soils. **(04 Marks)**

b. A Canal is to be excavated through a soil with C = 15 KN/m^2, $\phi = 20°$, e = 0.9 and G = 2.67. The side slopes is 1 in 1. The depth of canal is 6 m. Determine the FOS, with respect to cohesion when canal runs full. What will be the FOS, if the canal is rapidly emptied? Taylor's stability numbers are 0.06 and 0.114 respectively with respect to two cases. **(06 Marks)**

c. How do you locate the centre of critical slip circle using Fellinious method? **(06 Marks)**

Module-4

7 a. Explain in detail how bearing capacity of soil is determined using BIS method (IS6403). **(08 Marks)**

b. How do you consider the effect of water table on determination bearing capacity of soil. **(04 Marks)**

c. Compute the ultimate load that an eccentrically loaded square footing of width 2.1 m with an eccentricity of 0.35 m can take at a depth of 0.5 m in a soil with $r = 18\ KN/m^3$, $C = 9\ KN/m^2$, $N_C = 82$, $N_q = 35$, $N_r = 42$. **(04 Marks)**

OR

8 a. Proportion a rectangular combined footing for uniform pressure under dead load, plus reduced live load, using the following data:
Allowable soil pressure, 150 KN/m^2 for dead load + reduced live load.
225 KN/m^2 for dead load + live load

Column loads	Column A	Column B
Dead load (DL)	540 KN	690 KN
Live load (LL)	400 KN	810 KN

Distance C/C of columns = 5.4 m
Projection of footing beyond column A = 0.5 m. Draw the diagram. **(12 Marks)**

b. List the assumptions made in Terzaghi's analysis to find bearing capacity of soils. **(04 Marks)**

Module-5

9 a. With neat diagrams, explain the classification of piles based on different criteria. **(10 Marks)**

b. What is negative skin friction? How it is estimated in different types of soils. **(06 Marks)**

OR

10 a. Explain the static formula to find pile load carrying capacity. **(10 Marks)**

b. A 16 pile group has to be arranged in the form of a square in a soft clay with uniform spacing. Neglecting end bearing, determine the optimum value of spacing of the piles in terms of pile diameter. Assuming a shear mobilization factor 0.6. **(06 Marks)**

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CBCS SCHEME

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15CV/CT551

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

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define Air Pollution. Discuss the various sources of air pollutants. **(08 Marks)**

b. Explain the causes and effects of inversion of atmosphere. **(08 Marks)**

OR

2 a. Explain the classification and properties of air pollution. **(08 Marks)**

b. What are the factors affecting the photo – chemical reactions? With the necessary reactions, explain the basic theory of formation of photo – chemical smog. **(08 Marks)**

Module-2

3 a. With a neat sketch, explain the wind speed recorder and wind direction recorder devices used in measuring meteorological variables. **(08 Marks)**

b. Obtain an expression for particulate concentration at any co-ordinate and distance by Gaussian plume dispersion model. **(08 Marks)**

OR

4 a. With a neat sketch, explain the effective stack height. How do you calculate the effective stack height? **(08 Marks)**

b. Define Wind rose. With a neat sketch, explain how a wind rose is plotted. **(08 Marks)**

Module-3

5 a. What is meant by Air sampling? Explain non – isokinetic , isokinetic sampling and sampling train. **(08 Marks)**

b. Explain the colourimetric method and chromatographic method of analysis of atmospheric samplers. **(08 Marks)**

OR

6 a. What are the various analytical methods used for monitoring air pollution? **(08 Marks)**

b. How do you measure the oxides of sulfur and oxides of Nitrogen present in the ambient atmosphere using the high volume sampler and absorption solution? **(08 Marks)**

Module-4

7 a. List the different particulate control devices. Explain the principle , construction and working of an electrostatic precipitator, with a neat sketch. **(08 Marks)**

b. A thermal power plant installed an ESP with 5000m^2 of collector plate area. The ESP is 95% efficient in treating 200m^3/s of flue gas. Estimate how large the plate area should be to achieve 98 – 99% efficiencies for the ESP. **(08 Marks)**

OR

8 a. With a neat sketch, explain the operation of fabric filter. **(08 Marks)**

b. In a fabric filter, a bag house is to be designed to handle effluent gas flowing with the velocity of 600m^3/min. The filtering velocity is 4m/min. Each bag is 0.2m in diameter and 40m high. The bag house is to be square in cross section, with 0.30m spacing between bags and 0.20m clearance from the walls. Calculate

i) The number of bags required and ii) The width of the bag house. **(08 Marks)**

Module-5

9 a. Define Equivalent Sound Level (α_{eq}). Discuss the general control methods of noise pollution due to heavy vehicular traffic. **(08 Marks)**

b. Give the constituents of clean and dry atmospheric air quality. Also discuss the salient features of Air Pollution (prevention) Act 1981. **(08 Marks)**

OR

10 a. Define Noise. Write the units of noise and explain the intensity of noise. **(08 Marks)**

b. What are the various approaches to minimize exhaust emission? Explain. **(08 Marks)**

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CBCS SCHEME

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15CV561

Fifth Semester B.E. Degree Examination, June/July 2019
Traffic Engineering

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Explain the interdependency of "land use and transport" with a diagram. **(10 Marks)**

b. Discuss briefly the PIEV theory. **(06 Marks)**

OR

2 a. Describe the fundamentals of traffic flow. **(06 Marks)**

b. A passenger car weighing 3 tonnes is required to accelerate at a rate of $3m/sec^2$ in the first gear from 9 speed of 10 kmph to 25kmph. The gradient is +1% and road has a black topped surface. The frontal projection are of the car is $2m^2$. The car tyres have radius of 0.33m. The rear axle gear ratio is 3.82 : 1 and the first gear ratio is 2.78 : 1. Calculate the speed of the engine. The radius and deformation factor for tyres is 0.36 and 0.95 respectively. Assume transmission efficiency as 0.88 and f = 0.02, $c_a = 0.39$. **(10 Marks)**

Module-2

3 a. Explain the different types of classified volume survey presentation. **(06 Marks)**

b. Two vehicles A and B approaching at right angles, A from west and b from south, collide with each other. After collision, vehicle 'A' skids in a direction 50° N of west and vehicle 'B' 60°E of north. The initial skid distances of vehicles 'A' and 'B' are 38m and 20m respectively before collision. The skid distance after collision are 15m and 36m respectively. If the weights f vehicles 'A' and 'B' are 4.0 and 6.0T. Calculate the original speeds of vehicle. Assume f = 0.55. **(10 Marks)**

OR

4 a. Explain concept of Level Of Service (LOS) and its applications. **(06 Marks)**

b. The table Q4(b) below gives the consolidated data of spot speed studies on a section of a road. Determine : i) the upper and lower values or speed limits for installing speed regulations ii) modal speed for the range.

Table Q4(b) : Speed Studies

Speed range kmph	Number of speed observations	Speed range kmph	Number of speed observations
0 – 10	0	50 – 60	216
10 – 20	11	60 – 70	68
20 – 30	30	70 –80	24
30 – 40	105	80 – 90	0
40 – 50	233		

(10 Marks)

Module-3

5 a. At a right tangled intersection of two roads, road 1 has four lanes and road 2 has two lanes with a width of 12m and 6.6m respectively. The volume of traffic approaching the intersection during design hour are 900 and 743 PCU/hr on the two approaches of road2. design the signal timings as per IRC. **(12 Marks)**

b. Explain the significant roles of traffic control personnel. **(04 Marks)**

OR

6 a. Explain the three types of traffic sings with 3 examples for each with diagrams. **(10 Marks)**

b. Explain the design factors to be considered for design of rotary intersection. **(06 Marks)**

Module-4

7 a. Describe the causes of road accidents and also suggest preventive measures to control accidents. **(08 Marks)**

b. Describe the various environmental hazards due to traffic in urban areas. **(08 Marks)**

OR

8 a. Explain the arrangement of street lighting in urban areas and show the lighting arrangement sketch for signalized and rotary intersections. **(08 Marks)**

b. Explain the importance and promotion of non motorized transport. **(08 Marks)**

Module-5

9 a. Explain the various method of traffic segregation. **(08 Marks)**

b. Explain the concept of area traffic management system control (ATC) with an example. **(08 Marks)**

OR

10 a. Explain applications of Intelligent Transport System (ITS). **(08 Marks)**

b. Explain parking pricing and congestion pricing methods to control traffic management. **(08 Marks)**

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