CBCS Scheme

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15CV/CT51

Fifth Semester B.E. Degree Examination, June/Jul 2018
Design of RC Structural Elements

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer FIVE full questions, choosing one full question from each module.
2. Use of IS456-2000, SP16 permitted.

Module-1

1 a. Differentiate between working stress method and limit state method of RCC design. **(05 Marks)**

b. Define:
i) Partial safety factor for load and materials.
ii) Characteristic load.
iii) Characteristic strength. **(03 Marks)**

c. A simply supported beam of rectangular section spanning over 6m has a width of 300mm and overall depth 600mm. The beam is reinforced with 4-25mm bars on tension side. The beam is subjected to moment of 160kNm. Check the beam for serviceability limit state of cracking. Assume M25 and Fe415. **(08 Marks)**

OR

2 a. Derive the expression for stress block parameter for compresive force C_u, tensile force T_u and locate the depth of neutral axis $y = 0.42\ x_u$ from top of the beam. **(05 Marks)**

b. Explain briefly under reinforced, over reinforced and balanced sections with sketch. **(03 Marks)**

c. A simply supported beam of rectangular section 250mm wide by 450mm overall depth is used over an effective span of 4m. the beam is reinforced with 3 bars of 20mm. Two hanger bars of 10mm diameter are provided. The self weight of the beam is 4kN/m and service load is 10kN/m. Assume M20, Fe415.
Compute: i) Short term deflection; ii) Long term deflection. **(08 Marks)**

Module-2

3 a. Define simply and doubly reinforced beams list the situations when they are adopted. **(05 Marks)**

b. Determine moment of resistance of T-beam for the following data:
Width of the flange = 2500mm, effective depth = 800mm, width of the web = 300mm, number of bars = 8 of 25mm diameter, depth of flange = 150mm. Assume M20 and Fe415 steel. **(11 Marks)**

OR

4 a. A simply reinforced concrete beam 250 × 450mm deep upto the centre of reinforcement is reinforced with 3-16mm bars with an effective cover of 50mm. The effective span of the beam is 6m. Determine the central point load that the beam can carry excluding self weight. Assume M20 and Fe415. **(08 Marks)**

b. A doubly reinforced beam is 250mm wide and 450mm deep to the centre of tensile reinforcement. It is reinforced with 2-16 compression reinforcement and 4-25 as tensile reinforcement. Calculate the ultimate moment of resistance of the beam. Assume M15 and Fe250 steel. **(08 Marks)**

Module-3

5 a. Design a reinforced concrete beam of rectangular section using the following data: Effective span = 5m, width of the beam = 250mm, overall depth = 500mm, D.L + L.L. = 40 kN/m, effective cover = 50mm. **(07 Marks)**

b. A T beam slab floor of an office comprises of a slab 150mm thick resting on beams 3m c/c. The effective span of beam is 8m. Assume live load on the floor as 4kN/m^2. Use M20 and Fe415. Design one of the intermediate T beams. **(09 Marks)**

OR

6 a. A reinforced concrete beam over an effective span 5m carries a load of 8kN/m inclusive of self weight. Assume M20 and Fe415. Design the beam to satisfy the collapse and serviceability limit states. **(08 Marks)**

b. A cantilever beam of 4m span carries a load of 40kN/m. The width of the beam is 230mm. Design the beam for flexure and shear. Sketch the details of reinforcement. Assume M20 and Fe415. **(08 Marks)**

Module-4

7 a. Distinguish between one way slab and two way slab. **(04 Marks)**

b. Explain the importance of bond, anchorage length. **(04 Marks)**

c. Design a two way slab for an office floor of 3.5 × 4.5m simply supported on all sides with corners prevented from lifting. Take live load of 4kN/m^2. Assume M20 and Fe415. **(08 Marks)**

OR

8 a. What is development length? Write the expression for development length. **(04 Marks)**

b. Design one of the flights of dog logged stair case spanning between landing beams using the following data:

Number of steps in the flight	= 10
Tread	= 300mm
Rise	= 150mm
Width of landing beams	= 300mm

Assume M20 and Fe415. **(12 Marks)**

Module-5

9 a. What is the role of transverse reinforcement in columns? What are the codal provisions to design the transverse reinforcement? **(05 Marks)**

b. Design the reinforcement for a column of size 300 × 500mm to support a factored load of 500kN and a factored moment of 200 kNm. Assume M20 and Fe415. Sketch the reinforcement details. **(11 Marks)**

OR

10 a. Explain the different between short columns and long columns. Why is reduction coefficient applied to long column? **(04 Marks)**

b. Design a isolated forting for a rectangular column of 300mm × 500mm supporting an axial load of 1500kN factored. Assume SBC of soil as 185 kN/m^2. Use M20 and Fe415. Sketch the reinforcement and perform the necessary checks. **(12 Marks)**

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CBCS Scheme

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15CV52

Fifth Semester B.E. Degree Examination, June/July 2018
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 Analyze the continuous beam as shown in Fig.Q1 by slope deflection method and also determine its bending moment diagram and shear force diagram.

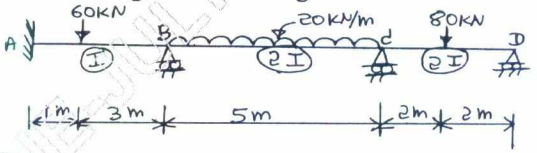

Fig.Q1 **(16 Marks)**

OR

2 Analyze the rigid jointed frame as shown in Fig.Q2 by slope deflection method and also determine its bending moment diagram.

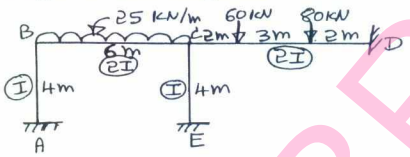

Fig.Q2 **(16 Marks)**

Module-2

3 Analyze the continuous beam as shown in Fig.Q3 by moment distribution method and also determine its bending moment diagram and shear force diagram.

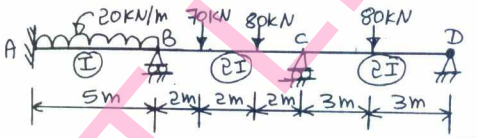

Fig.Q3 **(16 Marks)**

OR

4 Analyze the portal frame as shown in Fig.Q4 by moment distribution method and also determine its bending moment diagram.

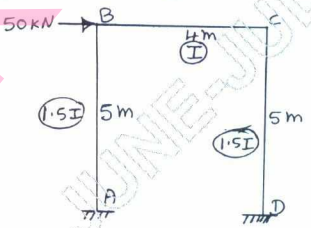

Fig.Q4 **(16 Marks)**

Module-3

5 Analyze the continuous beam as shown in Fig.Q5 by Kani's method and also determine its bending moment diagram and shear force diagram.

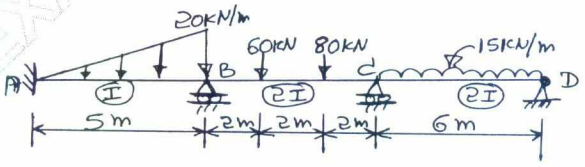

Fig.Q5 **(16 Marks)**

OR

6 Analyze the portal frame as shown in Fig.Q6 by Kani's method by taking the advantage of symmetry and also determine its bending moment diagram.

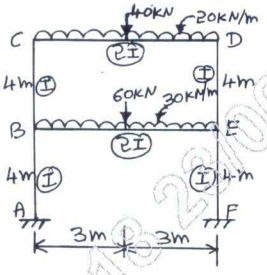

Fig.Q6 **(16 Marks)**

Module-4

7 Analyze the continuous beam as shown in Fig.Q7 by flexibility matrix method with system approach and also determine its bending moment diagram.

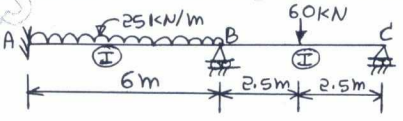

Fig.Q7 **(16 Marks)**

OR

8 Analyze the mill bent as shown in Fig.Q8 by flexibility matrix method with system approach and also determine its bending moment diagram.

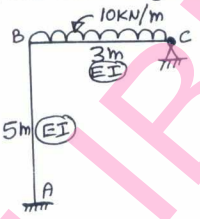

Fig.Q8 **(16 Marks)**

Module-5

9 Analyze the rigid jointed frame as shown in Fig.Q9 by stiffness matrix method with system approach and also determine its bending moment diagram.

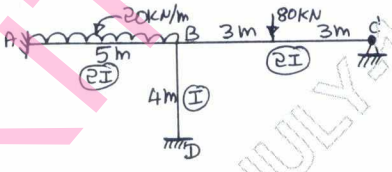

Fig.Q9 **(16 Marks)**

OR

10 Analyze the truss joint as shown in Fig.Q10 by stiffness matrix method with system approach and also tabulate the member forces. Cross section area of all members are 1000 mm^2 and E = 2 × 10^5 N/mm^2.

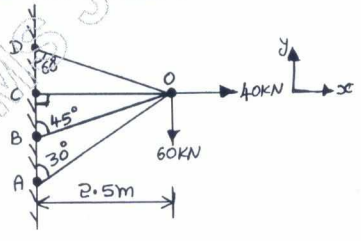

Fig.Q10 **(16 Marks)**

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15CV53

Fifth Semester B.E. Degree Examination, June/July 2018
Applied Geotechnical Engineering

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. What is subsurface exploration? What are objectives of soil exploration? **(08 Marks)**

b. What are Geophysical methods? Explain seismic refraction method with neat sketch. **(08 Marks)**

OR

2 a. List and explain different types of samplers used in soil sampling. **(08 Marks)**

b. What are the methods available for dewatering? Explain dewatering by well point system. **(08 Marks)**

Module-2

3 a. Derive the expressions for vertical stress and shear by using Boussinesq's theory. Also write expression for Westerguard's theory. **(08 Marks)**

b. What is Newmark's influence chart and also describe construction procedure for Newmarks's influence chart. **(08 Marks)**

OR

4 a. What are the types of settlement? Explain them with equations. **(08 Marks)**

b. A soft, normally consolidated clay layer 18 m thick. The natural water content, saturated unit weights specific gravity and liquid limit are 45%, 18 kN/m^3, 2.70 and 63% respectively. The vertical stress increment at centre of the layer due to the foundation load is 9 kN/m^2. The ground water level is at the surface of the clay layer. Determine the settlement of the foundation. **(08 Marks)**

Module-3

5 a. Define with neat sketch At rest, Active and Passive earth pressure. **(06 Marks)**

b. A retaining wall, 8 m high with a smooth vertical back, retains a clay backfill with $C' = 15$ kN/m^2, $\phi' = 15°$ and $\gamma = 18$ kN/m^3. Calculate the total active thrust on the wall assuming that tension cracks may develop to the full theoretical depth. **(10 Marks)**

OR

6 a. Explain the causes for slope failure and also list the type of slope failures. **(08 Marks)**

b. A 7m deep canal has side slope of 1:1. The properties of soil are $C_u = 20$ kN/m^2, $\phi_u = 15°$, e = 0.9 and G = 2.75. If Taylor's stability number is 0.108, determine the factor of safety with respect to cohesion when 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. **(08 Marks)**

Module-4

7 a. Write a note on standard penetration test and its corrections. **(08 Marks)**

b. Define safe bearing capacity, safe bearing pressure and allowable bearing pressure and also write expressions for the same. **(08 Marks)**

OR

8 a. Discuss the effect of ground water table on bearing capacity of soil. **(08 Marks)**

b. A square footing 2.5m × 2.5m is built on homogenous bed of sand of density 19 kN/m^3 and having an angle of shearing resistance of 36°. The depth of foundation is 1.5m below ground surface. Calculate safe load that can be applied on the footing with factor of safety 3. Take bearing capacity factors as $N_c = 27$, $N_q = 30$ and $N\gamma = 35$. **(08 Marks)**

Module-5

9 a. Explain the types of piles and also mention their uses. **(08 Marks)**

b. 200 mm diameter, 8 m long piles are used as foundation for column in a uniform deposit of medium clay (q_u = 100 kN/m^2). The spacing between the piles is 500mm. There are 9 piles in the ground arranged in a square pattern. Calculate the ultimate pile load capacity of the group. Assume adhesion factor = 0.9. **(08 Marks)**

OR

10 Write short notes on :

a. Piles in granular soils **(04 Marks)**

b. Settlement of pile group **(04 Marks)**

c. Negative skin friction **(04 Marks)**

d. Pile load tests. **(04 Marks)**

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15CV561

Fifth Semester B.E. Degree Examination, June/July 2018
Traffic Engineering

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. Missing data may be assumed suitably.

Module-1

1 a. Briefly explain various road user characteristics. **(08 Marks)**

b. A passenger car weighing 1800kg is to accelerate at a rate of $2m/s^2$ from a speed of 12kmph to 22 kmph in the first gear. The frontal area and coefficient of air resistance are $2.38m^2$ and 0.37 respectively. The transmission and rear gear ratio are 2.85:1 and 3.87:1 respectively. The radius and deformation factor of tyres are 0.35 and 0.945m respectively. Determine the engine horse power and speed of engine if transmission efficiency is 0.88. Take the gradient as + 1.2% and f = 0.025. **(08 Marks)**

OR

2 a. Discuss briefly the static and dynamic characteristics influencing the traffic. **(08 Marks)**

b. Establish the relationship between speed, flow and concentration using Green Shield theory. **(08 Marks)**

Module-2

3 a. List the different methods of measuring spot speeds. Explain any two. **(08 Marks)**

b. A vehicle of weight 30 tonnes skids through a distance of 50m before colliding with another parked vehicle of weight 3 tonnes. After collision, both the vehicles skid through a distance equal to 16m before stopping. Determine the speeds of vehicle assuming f = 0.4.

i) After collision
ii) At collision
iii) Before collision. **(08 Marks)**

OR

4 a. List the factors considered in evaluating the level of service and explain the operating conditions for the six levels of service selected by HCM. **(08 Marks)**

b. For the following data determine :

i) Lower speed limit
ii) Medium speed limit
iii) Upper speed limit
iv) Design speed
v) Arithmetic mean speed
vi) Modal speed
vii) Median speed
viii) Standard deviation and variance.

Speed range (kmph)	0 to 10	10 to 20	20 to 30	30 to 40	40 to 50	50 to 60	60 to 70	70 to 80	80 to 90
Frequency (f)	12	18	68	89	204	255	199	43	33

(08 Marks)

Module-3

5 a. List the advantages and disadvantages of channelized and unchannelized intersections. **(08 Marks)**

b. Discus briefly the different types of co-ordinated signal system. **(08 Marks)**

OR

6 a. Discuss briefly the different types of road markings. **(08 Marks)**

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

Module-4

7 a. Discuss briefly the various causes of accidents. **(08 Marks)**

b. Write note on :

i) Public transportation

ii) Non – Motorized traffic **(08 Marks)**

OR

8 a. Explain briefly the different types of lamps used for street lighting. **(08 Marks)**

b. Discuss briefly the causes and preventive measures of air pollution and noise pollution due to traffic. **(08 Marks)**

Module-5

9 a. Explain the importance and application of ITS in traffic engineering. **(08 Marks)**

b. Discuss briefly the principle behind road pricing and the requirement of a good pricing system. **(08 Marks)**

OR

10 Write a note on :

a. Restriction on turning movements

b. One way streets

c. Tidal flow operation

d. Closing side – streets. **(16 Marks)**

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