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CBCS SCHEME

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15CV/CT51

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
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, SP-16 permitted.*
3. *Assume any missing data suitably.*

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. Briefly explain the principles of limit state. **(06 Marks)**

b. Briefly explain the modes of failure of beam sections with sketches. **(06 Marks)**

c. What are the causes of cracking in RC members? **(04 Marks)**

OR

2 A simply supported beam has a rectangular section and carries a uniformly distributed load of 20 kN/m over a clear span of 4.5 m. The cross section is 300mm × 550mm and is reinforced with 4 no's of 20 mm diameter bar.
Assume cover = 25 mm and bearing = 300 mm. Assuming, M20 grade concrete and Fe415 steel, compute short and long term deflection of the beam. **(16 Marks)**

Module-2

3 a. A Cantilever R.C. beam of span 2 m is rectangular in cross section 230 mm × 380 mm. It is reinforced with 3 – 16 mm diameter bars on tension side. Assume clear cover as 25 mm. M20 grade concrete and Fe415 steel is used. Determine the permissible concentrated load at the free end of Cantilever. **(08 Marks)**

b. A Doubly reinforced beam section 250 mm wide 500 mm deep to the centre of the tensile reinforcement. It is reinforced with 3 – 16 mm diameter bars as compression reinforcement at an effective cover of 50 mm and 4 bars of 20 mm diameter as tension reinforcement. Determine the moment of resistance of the section. M20 concrete and Fe500 steel is used. **(08 Marks)**

OR

4 a. Determine the minimum effective depth required and the corresponding area of tension reinforcement for a rectangle beam having a width of 200 mm to resist an ultimate moment of 200 kN-m. M20 grade concrete and Fe415 steel is used. **(04 Marks)**

b. A reinforced concrete beam has a support section with a width of 250 mm and effective depth of 500 mm. The support section is reinforced with 3 bars of 20 mm diameter on the tension side. 2 legged 8 mm diameter stirrups are provided at a spacing of 200 mm centre to centre. Calculate the shear strength of the support section for M20 grade concrete and Fe415 steel. **(06 Marks)**

c. A singly reinforced slab 120 mm thick is supported by T-beam spaced at 3 m C/C, the effective depth and width of web are 580 mm and 450 mm respectively. Eight HYSD bars of 20 mm diameter have been provided in tension in two layers, with 4 no's in each layer. The effective cover in lower tier is 50 mm. The effective span of simply supported beam is 3.6 m and grade of concrete is M20. Determine the depth of neutral axis and the moment of resistance of T-beams section. **(06 Marks)**

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Module-3

5 a. Design the shear reinforcement for an RC beam 300mm × 600mm effective carrying a uniformly distributed load of 30 kN/m run factored over a span of 6 m supported over 300 mm wide beams. Use M20 grade concrete and Fe415 grade steel. **(08 Marks)**

b. Design the reinforcement for tension and compression reinforcement side and its percentage for a doubly reinforced rectangular beam simply supported at both ends. The size of the beam is 300 mm × 600mm effective. Effective cover to compression reinforcement is 50 mm. The ultimate factored total load of 90 kN/m including self weight of beam is acting between the supports of effective span 6.0 m. Grade of concrete and steel are M20 and Fe415. **(08 Marks)**

OR

6 Design one of the intermediate T-beam for a hall measuring 7m × 12m with beams spaced at 3 m C/C. Depth of slab is 120 mm. Live load on slab is 9.5 kN/m^2 including finishes. Use M20 grade concrete and HYSD bars. **(16 Marks)**

Module-4

7 a. Distinguish between one way and two way slab. **(02 Marks)**

b. Design an interior panel of a two-way slab of size 5m × 5m. Live load = 3 kN/m^2, floor finish = 1 kN/m^2 and bearing = 300 mm. Adopt M20 grade concrete and Fe415 grade steel. Sketch the reinforcement details in plan. **(14 Marks)**

OR

8 The clear dimension of a stair case hall is 2.4 m × 4.75 m. The floor to floor height is 3.52 m. A two flight dog legged stair is to be provided between the two floors with a rise of 160 mm. Design the stairs and also check for deflection. Sketch the reinforcement details of any one of the flight. **(16 Marks)**

Module-5

9 a. A RCC square column of side 300 mm is reinforced with 4 bars of 16 mm diameter. Determine the allowable service load on the column. M25 grade concrete and Fe500 steel is used. **(04 Marks)**

b. A rectangular column of size 300mm × 500mm is subjected to an axial load of 1200 kN and moment of 30 kN-m acting about an axis bisecting the depth of column. Effective cover = 50 mm. Calculate the necessary reinforcement adopting M20 grade concrete and Fe415 steel. Sketch the reinforcement details. **(12 Marks)**

OR

10 Design a rectangular footing of flat type for a column of size 300 mm × 500 mm carrying an axial load of 1200 kN. SBC of soil is 200 kN/m^2. Adopt M20 concrete and Fe500 steel. Sketch the reinforcement details. **(16 Marks)**

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15CV52

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Analysis of Indeterminate Structures

Time: 3 hrs. Max. Marks: 80

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

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 Analyze the continuous beam shown in Fig.Q.1 by slope deflection method and draw BMD. **(16 Marks)**

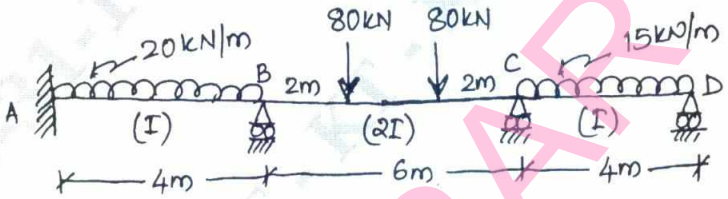

Fig.Q.1

OR

2 Analyze the rigid frame shown in Fig.Q.2 by slope deflection method and draw BMD. **(16 Marks)**

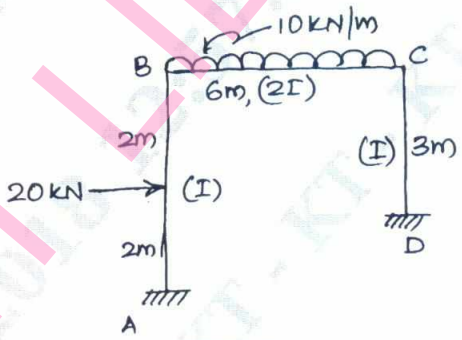

Fig.Q.2

Module-2

3 Analyze and draw BMD for the continuous beam shown in Fig.Q.3 by moment distribution method if support 'B' sinks by 30mm and support 'C' sinks by 20mm.
Take EI = 24,000 kNm^2. **(16 Marks)**

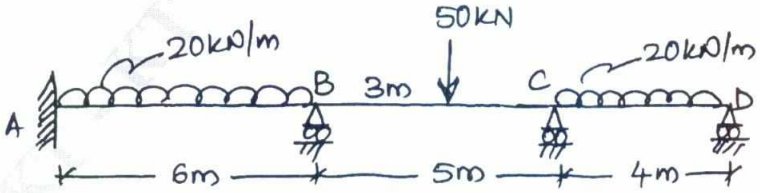

Fig.Q.3

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OR

4 Analyze the rigid frame shown in Fig.Q.4 by moment distribution method and draw BMD. **(16 Marks)**

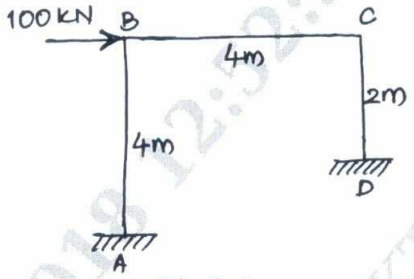

Fig.Q.4

Module-3

5 Analyze and draw BMD for the continuous beam shown in Fig.Q.5 by Kani's method, if support 'B' sinks by 10mm and $E = 2 \times 10^5$ N/mm^2, $I = 1.2 \times 10^{-4}$ m^4. **(16 Marks)**

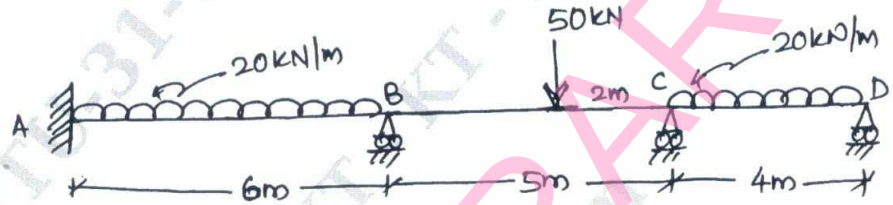

Fig.Q.5

OR

6 Analyze the rigid frame shown in Fig.Q.6 by Kani's method and draw BMD. **(16 Marks)**

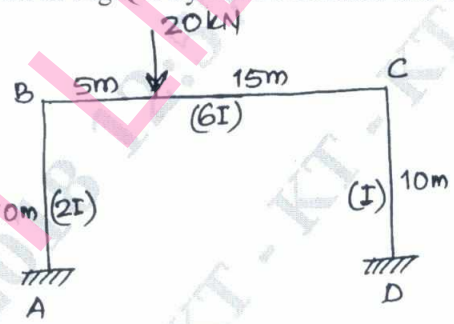

Fig.Q.6

Module-4

7 Analyze the continuous beam shown in Fig.Q.7 by matrix flexibility method using system approach and draw BMD. Take moments as redundants. **(16 Marks)**

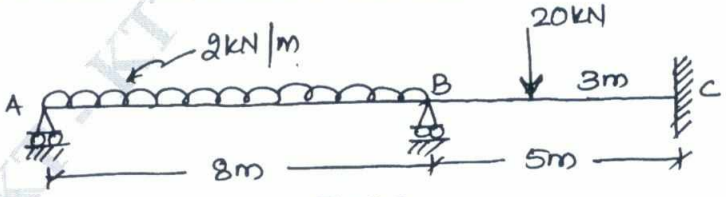

Fig.Q.7

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OR

8 Analyze the pin-jointed truss shown in Fig.Q.8 by matrix flexibility method of system approach and determine forces in all the members. Take force in member 'OA' as redundant. **(16 Marks)**

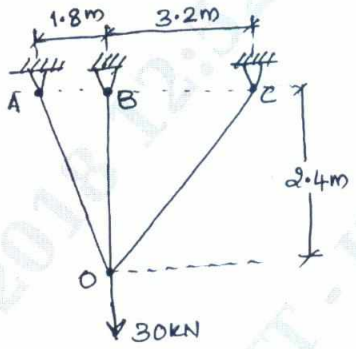

Fig.Q.8

Module-5

9 Analyze the rigid frame shown in Fig.Q.9 by matrix stiffness method and draw BMD. **(16 Marks)**

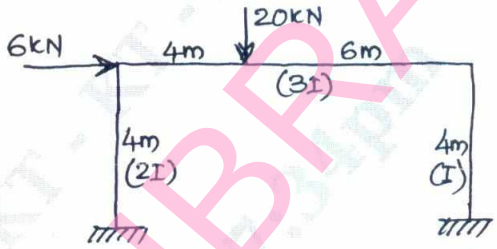

Fig.Q.9

OR

10 Analyze the pinjointed frame shown in Fig.Q.10 by matrix stiffness method and find forces in all the members. The numbers in parentheses are the C/S areas of members in sqmm. (Take E = constant). **(16 Marks)**

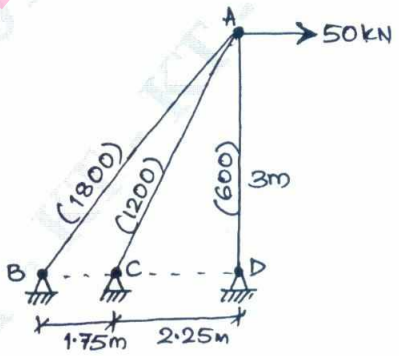

Fig.Q.10

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15CV53

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Applied Geotechnical Engineering

Time: 3 hrs. Max. Marks: 80

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

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. What is Stabilization of bore holes? Mention various methods and explain any one method. **(06 Marks)**

b. With the help of neat sketch, explain Seismic Refraction method of soil exploration. Using this method, determine the velocity of waves in soil layers and thickness of the top stratum, for the following details :

Time (s) :	0.1	0.2	0.3	0.4	0.45	0.50	0.55
Distance (m) :	40	80	120	160	200	240	280

Geophones are placed at a spacing of 40m in a straight line and the time taken for the last wave to be received at each geo – phone is given. **(10 Marks)**

OR

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

b. Explain the determination of ground water level by Hvorslev's method. Using this method estimate the ground water table level for the following data :
Depth up to which water is boiled out = 15m ; Water rise on first day = 0.80m ;
Water rise on second day = 0.70m ; Water rise on third day = 0.60m. **(10 Marks)**

Module-2

3 a. Explain types of settlements with formulae. **(06 Marks)**

b. Define Isobar. Using Boussenesq's equation construct isobar of intensity 0.25 Q (25% isobar), where Q is point load acting on the surface. **(10 Marks)**

OR

4 a. A circular area 6m diameter carries a uniformly distributed load of $10kN/m^2$, determine the vertical stress at a depth of 2m, 4m and 8m. Plot the variation of vertical stress with depth. **(06 Marks)**

b. A square footing 1.2m × 1.2m rests on a saturated clay layer 4 deep. $W_L = 30\%$, $\gamma_{sat} = 17.8kN/m^3$, W = 28% and G = 2.68. Determine the settlement if the footing carries a load of 300kN. **(10 Marks)**

Module-3

5 a. Explain Fellinious method of obtaining centre of critical slip surface in the case of stability analysis of C – ϕ soil. **(06 Marks)**

b. A retaining wall of height 10m supports cohesionless soil with the following properties. G = 2.65 , e = 0.65 and $\phi = 30^0$, Water table lies at 3m depth. Surface of back fill is horizontal and carries surcharge of intensity $14kN/m^2$. Draw lateral active earth pressure distribution diagram. Determine total active earth pressure and its point of application. **(10 Marks)**

OR

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6 a. Derive equations for the earth pressure coefficients K_a and K_p by considering back fill with horizontal surface. Use Rankine's theory. **(06 Marks)**

b. An embankment is to be constructed with a soil having $C = 20kN/m^2$, $\phi = 10^0$ and $\gamma = 19kN/m^3$. The desired factor of safety with respect to cohesion as well as friction as 1.5. Determine i) Safe height of the desired slope if slope is 2H to 1V.
ii) Safe angle of slope if the desired height is 15m. For $\phi = 10^0$; Taylor's stability numbers are as follows : **(10 Marks)**

Stability No :	0.04	0.08
Slope angle (i) :	20	30

Module-4

7 a. With the help of sketches, explain effect of water table and eccentric loading on bearing capacity soil. **(06 Marks)**

b. A square footing located at a depth of 1.3m below the ground has to carry a load of 800kN. Find the size of footing, if the desirable factor of safety is 3. The soil has the following properties. Void ratio = 0.55 ; degree of saturation = 50% , Specific gravity = 2.67 , Cohesion = 8KPa , Angle of shearing resistance = 30^0 , $N_c = 37.2$, $N_q = 22.5$ and $N_\gamma = 19.7$. **(10 Marks)**

OR

8 a. Explain Standard Penetration test with suitable corrections. **(06 Marks)**

b. A rectangular footing has a size of 1.8m × 3m has to transmit the load of a column at a depth of 1.5m. Calculate the safe load which the footing can carry at a factor of safety of 3 against shear failure. Use IS code method. The soil has following properties : n = 40% ; G = 2.67 ; W = 15% ; $C = 8kN/m^2$ and $\phi = 32.5^0$. **(10 Marks)**

Module-5

9 a. With the help of sketch, explain negative skin friction. **(06 Marks)**

b. A 200mm diameter, 8m long piles are used as foundation for a column in a uniform deposit of medium clay having unconfined compressive strength of $100kN/m^2$. The spacing between the piles is 500mm. There are 9 piles in the ground arranged in a square pattern. Calculate the ultimate load capacity of the group. Assume adhesion factor = 0.9 and $N_C = 9$. **(10 Marks)**

OR

10 Write short notes on any four of the following :

a. Efficiency of pile group.
b. Group capacity of piles.
c. Pile load test.
d. Settlement of piles.
e. Under reamed piles.
f. Single loaded pile capacity. **(16 Marks)**

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15CV/CT551

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Air Pollution and Control

Time: 3 hrs. Max. Marks: 80

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

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. Define air pollution and briefly explain the various sources of air pollution. **(06 Marks)**

b. Explain the subsidence inversion and radiation inversions in detail. **(06 Marks)**

c. What are the effects of photo chemical smog? **(04 Marks)**

OR

2 a. Distinguish between primary and secondary air pollutants with examples. **(08 Marks)**

b. Explain the effects of air pollutants on human health along with a neat sketch. **(08 Marks)**

Module-2

3 a. Explain the important meteorological parameters that influence air pollution. **(08 Marks)**

b. Explain the various types of Plume behavior, with a neat sketch showing temperature gradient. **(08 Marks)**

OR

4 a. Explain wind rose with neat sketch in detail. **(08 Marks)**

b. Calculate the effective stack height from the following data using:

(i) Inner diameter of stack = 0.6 m
(ii) Constructed stack height = 30 m
(iii) Wind velocity = 4 m/sec
(iv) Barometric pressure = 900 millibar
(v) Stack gas velocity = 8.2 m/sec
(vi) Stack gas temperature = 110°C
(vii) Atmospheric air temperature = 23°C **(08 Marks)**

Module-3

5 a. With a neat sketch, describe the methods of gaseous sampling by sampling train. **(10 Marks)**

b. Write a brief note on indoor air pollution. **(06 Marks)**

OR

6 a. Explain the analysis of following air pollutants:

(i) SO_x (ii) NO_X (iii) CO **(08 Marks)**

b. The following data were obtained in an ambient air quality monitoring in a residential area. Find the concentration of suspended particulate matter.

(i) Duration of sampling = 8 hrs.
(ii) Initial weight of filter paper = 1.6978 gms.
(iii) Final weight of filter paper = 1.7120 gms.
(iv) Atmospheric temperature = 28°.
(v) Atmospheric pressure = 690 mm of Hg.
(vi) Sampling rate (initial) = 1.4 m^3/min.
(vii) Sampling rate (final) = 1.2 m^3/min **(08 Marks)**

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Module-4

7 a. With a neat sketch, explain the principle, construction and working of an ESP. **(10 Marks)**

b. Explain with a neat sketch, settling chamber. **(06 Marks)**

OR

8 a. List the different types of scrubbers and explain any one of them with a neat sketch. **(10 Marks)**

b. Calculate the size of the particle which can be collected in a cyclone having 50% collection from the following data:

(i) Inlet width = 30 cm
(ii) Inlet gas velocity = 3.2 m/sec.
(iii) Particle density = 1.6 gm/cc
(iv) Temperature of gas = 23°C
(v) Dynamic viscosity of gas = 0.181×10 poise at 23°C
(vi) Effective turns = 8. **(06 Marks)**

Module-5

9 a. Briefly discuss the different control measures adopted to check the air pollutants emitted by automobiles. **(10 Marks)**

b. What is noise pollution? What are sources of noise pollution? **(06 Marks)**

OR

10 a. What is green house effect? Explain briefly effect of green house on environment. **(08 Marks)**

b. Explain the Bhopal gas Tragedy in detail. **(08 Marks)**

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15CV561

Fifth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Traffic Engineering

Time: 3 hrs. Max. Marks: 80

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

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. In detail explain the road user characteristics. **(08 Marks)**
b. Derive an expression for flow and concentration using Green-shield theory. **(08 Marks)**

OR

2 a. Explain the details of vehicle characteristics affecting road design. **(08 Marks)**
b. Explain urban traffic problems and measure to meet the problems. **(08 Marks)**

Module-2

3 a. Briefly explain the various causes of accidents. **(08 Marks)**
b. Define the term spot speed. Explain the presentation of spot speed data. **(08 Marks)**

OR

4 a. Explain the preventive measures to reduce accidents. **(08 Marks)**
b. Explain the importance and methods of traffic forecasting. **(08 Marks)**

Module-3

5 a. Enumerate the design factors and advantages of rotary intersection. **(10 Marks)**
b. Write short notes on: i) Road markings ii) Channelized intersections. **(06 Marks)**

OR

6 a. What are the advantages and disadvantages of traffic signal? **(08 Marks)**
b. Explain traffic signal design as per IRC method. **(08 Marks)**

Module-4

7 a. Explain various design factors of highway lighting. **(10 Marks)**
b. Explain the various detrimental effect of traffic noise. **(06 Marks)**

OR

8 a. List and explain different types of lighting layouts. **(08 Marks)**
b. Explain the measure to control the traffic noise. **(08 Marks)**

Module-5

9 a. Discuss the details of traffic system management. **(08 Marks)**
b. List and explain the various phases of traffic regulation. **(08 Marks)**

OR

10 Write short notes on:
a. TDM b. ITS
c. Traffic congestion d. Road pricing system. **(16 Marks)**

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