CBCS Scheme

Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
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. Use of code IS456:2000 and SP-16 is permitted.

Module-1

1   a.   Explain: (i) Characteristic load; (ii) Characteristic strength; (iii) Partial safety factor.
          (06 Marks)
   b.   What is stress block? Derive from the fundamentals the expressions for the area of stress block $0.36 f_{ck}bx_u$ and depth of centre of compressive force from the extreme fibre in compression $0.42 x_u$.   **(10 Marks)**

OR

2   a.   Explain: (i) Developmental length of bars; (ii) Short term deflection; (iii) Long term deflection   **(06 Marks)**
   b.   A rectangular simply supported beam of span 5 m is 300×650 mm in cross section and is reinforced with 3 bars of 20 mm on tension side at an effective cover of 50 mm. Determine the short deflection due to an imposed working load of 20 kN/m excluding self weight. Assume grade of concrete M20 and steel as Fe415.   **(10 Marks)**

Module-2

3   a.   Differentiate between under reinforced, over reinforced and balanced section.   **(06 Marks)**
   b.   A RCC beam of section 300 mm $\times$ 500 mm is reinforced with 4 bars of 16 mm diameter with an effective cover of 50 mm. The beam is simply supported over a span of 5 m. Find the maximum permissible udl on the beam. Use M20 grade concrete and Fe 500 steel.
          (10 Marks)

OR

4   a.   A RCC beam 250 mm wide and 450 mm deep is reinforced with 3 numbers of 20 mm dia bars of grade Fe415, on the tension side with an effective cover of 50 mm. If the shear reinforcement of 2 legged-8 mm dia stirrups at a spacing of 160 mm c/c is provided at a section, determine the design ultimate strength of the section. Assume M20 concrete.
          (07 Marks)
   b.   A T-beam RC floor system consists of 120 mm thick slab supported by beams at 3m c/c. The effective width and depth of web is 300*580 mm as shown in Fig.Q4(b). Main reinforcement consists of 8 bars of 20 mm dia. The grade of concrete and steel used are M20 and Fe415 respectively. Determine the moment of resistance of T-beam, if it is used as simply supported beam of span 3.6 m.
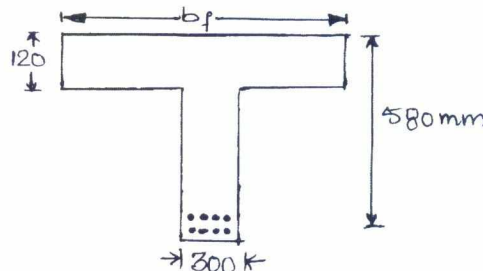

Fig.Q4(b)   **(09 Marks)**

Module-3

5 A rectangular beam is to be simply supported on supports of 230 mm width. The clear span of the beam is 6m. The beam is to have width of 300 mm. The super imposed load is 12 kN/m. Using M20 concrete and Fe415 steel. Design the beam. Apply check for deflection. **(16 Marks)**

OR

6 Design a rectangular beam of section 230 mm × 600 mm of effective span 6m. Effective cover of reinforcement should be kept as 50 mm. Imposed load on the beam is 40 kN/m. Use M20 concrete and Fe 415 steel. **(16 Marks)**

Module-4

7 Design a continuous RC slab for a class room 7m wide and 14 m long. The roof is to be supported on RCC beams spaced at 3.5 m intervals. The width of beam should be kept 230 mm. The super imposed load is 3 kN/m² and furnishing load expected is 1 kN/m². Use M20 concrete and Fe415 steel. **(16 Marks)**

OR

8 Design a dog legged stairs for an office building in a room measuring 2.8m * 5.8 m clear. Vertical distance between the floor is 3.6m. Width of flight is to be 1.25 m. Allow a live load of 3 kN/m². Sketch the details of reinforcement. Use M20 concrete and Fe 415 steel. Assume the stairs are supported on 230 mm walls at the end of outer edges of landing slabs. **(16 Marks)**

Module-5

9 A corner column 400 * 400 mm, is subjected to the factored loads P_u = 1300 kN, M_{ux} = 190 kN-m and M_{uy} = 110 kN-m. Design the reinforcement in the column, assuming M25 concrete and Fe 415 steel and effective cover of 60 mm. Assume it as short column. **(16 Marks)**

OR

10 Design a square footing for a short axially loaded column of size 300 mm * 300 mm carrying 600 kN load. Use M20 concrete and Fe415 steel. SBC of soil is 180 kN/m². Sketch the details of reinforcement. **(16 Marks)**

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Fifth Semester B.E. Degree Examination, Dec.2017/Jan.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 shown in Fig.Q1 by slope deflection method. Draw BMD and EC.
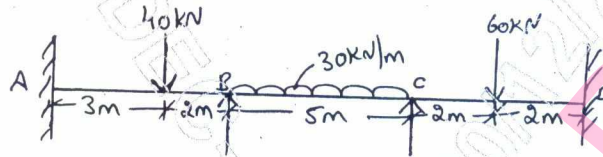
Fig.Q1   **(16 Marks)**

OR

2   Analyze the portal frame shown in Fig.Q2 by slope deflection method. Draw BMD.
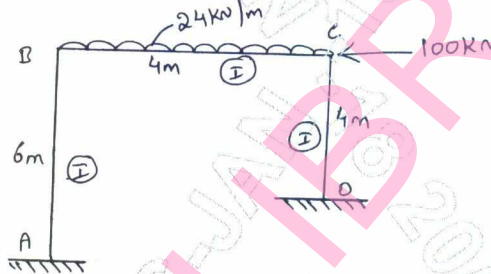
Fig.Q2   **(16 Marks)**

Module-2

3   Analyze the continuous beam by moment distribution method shown in Fig.Q3. The support 'B' sinks by 10 mm. Take $EI = 4000$ kN-m^2. Draw BMD and EC.
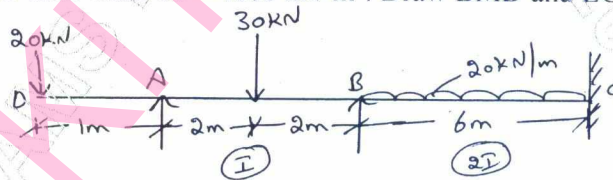
Fig.Q3   **(16 Marks)**

OR

4   Analyze the frame shown in Fig.Q4 by moment distribution method. Draw BMD.
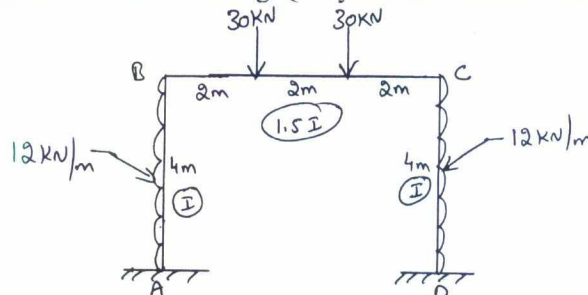
Fig.Q4   **(16 Marks)**

Module-3

5 Analyze the continuous beam by Kani's method. Shown in Fig.Q5. Draw BMD.
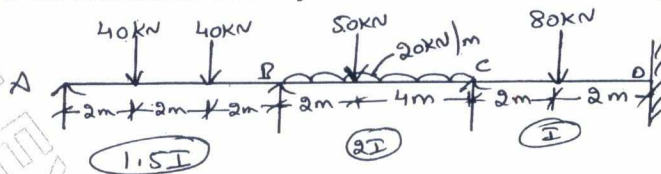
Fig.Q5 **(16 Marks)**

OR

6 Analyze the frame shown in Fig.Q6 by Kani's method. Draw BMD.
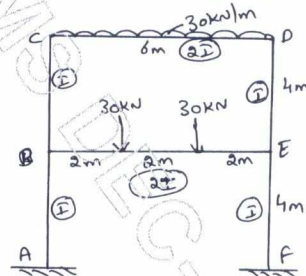
Fig.Q6 **(16 Marks)**

Module-4

7 Analyze the beam shown by flexibility matrix method. Draw BMD.

Fig.Q7 **(16 Marks)**

OR

8 Analyze the beam shown in Fig.Q8 by flexibility matrix method. Draw BMD.

Fig.Q8 **(16 Marks)**

Module-5

9 Analyze the continuous beam shown in Fig.Q9 by stiffness matrix method. Draw BMD.

Fig.Q9 **(16 Marks)**

OR

10 Analyze the portal frame shown in Fig.Q10 by stiffness matrix method. Draw BMD.

Fig.Q10 **(16 Marks)**

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Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
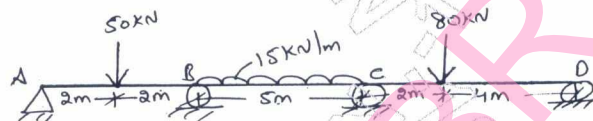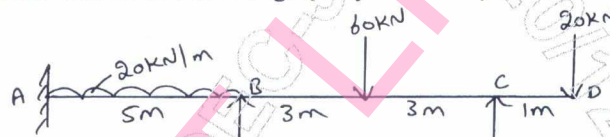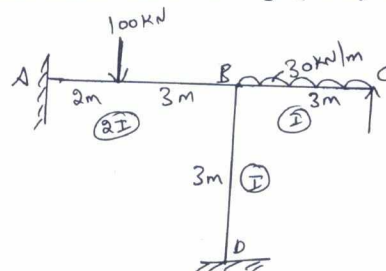## Applied Geotechnical Engineering

Time: 3 hrs. 　　　　　　　　　　　　　　　　　　　　　　　　Max. Marks: 80

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

Module-1

1 a. Describe with neat sketch wash boring technique to explore soil. **(08 Marks)**
  b. The following sizes of sampling tubes are available in market.

Sample No.	I	II	III
Outer Diameter (mm)	75	110	50
Inner Diameter	72	107	35
Length (mm)	600	600	600

  Out of these which one would you select for obtaining undistributed Soil sample from a base hole, Apply appropriate technique to get best undisturbed sample. **(08 Marks)**

OR

2 a. Explain with neat sketch, electrical resistivity method of soil exploration. **(06 Marks)**
  b. Predict the Ground water table given the following data: Depth upto which water is boiled out 18 m, Water rise in I day = 0.95 m, II day = 0.86 m and III day = 0.78 m, use the Hvorslev's method for predicting ground water table. **(10 Marks)**

Module-2

3 a. Compare Boussinesq's theory with Westergaard's theory with a logical graph analysis. **(08 Marks)**
  b. Find intensity of vertical pressure at a point 3 m directly below 25 kN point load acting on a horizontal ground surface. What will be the vertical pressure at a point 2 m horizontally away from the axis of loading and at same depth of 3 m? Use Boussinesq's equation. **(08 Marks)**

OR

4 a. Explain components of settlements. **(12 Marks)**
  b. A reinforced concrete foundation of dimensions $1.8m \times 3.6m$ exerts a uniform pressure of 180 kN/m^2 on a soil mass, with E-value $45MN/m^2$. Determine the value of Immediate settlement under the foundation. Take $\mu = 0.3$ and $I_f = 1.0$ **(04 Marks)**

Module-3

5 a. Compare Coulomb's Earth pressure theory over Rankin's Earth pressure theory. **(06 Marks)**
  b. Determine the active earth pressure using Rebhann's graphical method. **(10 Marks)**

OR

6 a. Explain the procedure for determination of factor of safety using method of slices for C-ϕ-soil. **(12 Marks)**
  b. An Embankment is inclined at an angle 35° and its height is 15 m. The angle of shearing resistance is 15° and the cohesion interrept is 40 kN/m². The unit weight of soil is 18 kN/m³. Examine the factor of safety with respect to cohesion. Consider Taylor's stability number = 0.06. **(04 Marks)**

Module-4

7 a. Determine the bearing capacity of the soil by using plate load test as per IS : 1888 guidelines. **(08 Marks)**

   b. A square footing located at a depth of 1.3 m below ground has to carry a safe load of 800 kN. Predict the size of fooling which is safe against applied load. If the desired factor of safety is 3.0. Assume e = 0.55, Degree of Saturatm = 50%m G = 2.67, C = 8 kN/m^2. Use Terzagh's analysis for general shear failure. Assume $\phi = 30°$, $N_C = 37.2$, $N_q = 22.5$ and $N_r = 19.7$ **(08 Marks)**

OR

8 a. Generalize the assumptions made by Terzagh's bearing capacity theory for development of bearing capacity equation. **(08 Marks)**

   b. Determine the bearing capacity of the soil by using standard penetration test as per IS : 2131 guidelines. **(08 Marks)**

Module-5

9 a. Classify the various type of Piles based on material and function. **(10 Marks)**

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

OR

10 a. Explain with a neat sketch the construction and working of under remmed pile. **(10 Marks)**

   b. Justify with a neat sketch, how static formula summarize the load transfer mechanism in pile foundations. **(06 Marks)**

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Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Air Pollution and Control

Time: 3 hrs.   Max. Marks: 80

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

Module-1

1 a. Define Air Pollution. Explain Primary and Secondary air pollutants.   (08 Marks)
   b. With respect to Air pollution, explain air borne contaminants.   (08 Marks)

OR

2 a. Enumerate the effects of Air pollution on Human Health and Vegetation.   (08 Marks)
   b. Define Inversion. Briefly explain the different types of inversion with the aid of neat sketches.   (08 Marks)

Module-2

3 a. Explain the structure and the companion of atmosphere.   (08 Marks)
   b. Define Lapse rate. Explain the different types of lapse rate.   (08 Marks)

OR

4 a. What are the assumptions and limitations of the Gaussian Plume dispersion model?   (08 Marks)
   b. A Thermal power plant releases SO_2 at a rate of 138.8 g/s. The stack height is 120m. While the temperature of the stack gas is 150^0C and the ambient air temperature is 35^0C. The wind velocity at the stack height is 8.5m/s. While the stack gas velocity is 10m/s. The stack diameter is 3.5m. The atmospheric pressure is 1.005 bar. Estimate the effective stack height.
                                                                                   (08 Marks)

Module-3

5 a. What is meant by Air sampling? Explain briefly sampling train.   (08 Marks)
   b. With eh help of the neat sketch, explain the measurement of SPM in ambient air.   (08 Marks)

OR

6 a. With the help of neat sketch, explain high volume air sampler for measurement of particulate matter.   (08 Marks)
   b. Briefly explain any one method of measuring SO_2 in the stack.   (08 Marks)

Module-4

7 a. Explain the factors affecting the selection of the particulate air control devices.   (08 Marks)
   b. Briefly explain the particulate matter removal by gravity Sattler, with the help of neat sketch.   (08 Marks)

OR

8 a. With the help of neat sketch, explain the working principle of Electro Static Precipitation.
                                                                                   (08 Marks)
   b. A cement plant was emitting flue gas at the rate of 20,000 m^3/h. Assuming inlet gas velocities of 2m/s. Design a tubular ESP with 0.20m diameter with 7 cylinders to achieve the efficiency of 90% and 95%.   (08 Marks)

Module-5

9 a. Explain briefly the emission of the gasoline driven vehicles and diesel driven vehicles.
(08 Marks)

b. Define Noise Pollution. Explain the sources and control methods of Noise - Pollution.
(08 Marks)

OR

10 Write short notes on any Four of the following :
a. Acid rain and its effects.
b. Bhopal gas tragedy.
c. Air quality standards.
d. Noise Pollution standards.
e. Environmental policy.
f. Kyoto protocol.
(16 Marks)

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CBCS Scheme

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Fifth Semester B.E. Degree Examination, Dec.2017/Jan.2018
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. List the different road users characteristics and explain the concept of PIEV theory.
(08 Marks)

   b. Discuss various urban traffic problem that India is facing. List some remedial measures also.
(08 Marks)

OR

2   a. What are the different vehicular characteristics which affect road design? Explain.
(08 Marks)

   b. Write short notes on :
   i)   Fundamentals of traffic flow
   ii) Integrated planning of town.
(08 Marks)

Module-2

3   a. Mention various applications of "O and D" study. Explain road side interview method of collecting "O and D" data. **(08 Marks)**

   b. Spot speed studies were carried out at a certain stretch of a road highway and the consolidated data collected are given below :

Speed range (km ph)	Number of vehicles observed	Speed arrange (km ph)	Number of vehicles observed
0 to 10	12	50 to 60	255
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	09

   Determine :
   i) Upper and lower values of speed limit for regulation
   ii) Design speed for checking the geometric design element of the highway.   **(08 Marks)**

OR

4   a. Explain the following terms :
   i)   Time headway
   ii)   Space headway
   iii) Traffic volume
   iv)   Level of service.
(08 Marks)

   b. Define the term "spot speed study". With neat sketch explain enoscope method of measuring spot speed study.
(08 Marks)

Module-3

5 a. What are the advantages and disadvantages of rotary intersection? **(08 Marks)**

   b. i) Define briefly signal "cycle" and "Interval"
      ii) 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 and 1000 PCU per hour respectively. The all red time required for pedestrian crossing is 12 secs. Design two phase traffic signal by Webster's method. Sketch phase diagram also. **(08 Marks)**

OR

6 a. Mention various classifications of traffic signs. Explain any two of them with neat sketches. **(08 Marks)**

   b. Write short notes on :
      i) Road markings
      ii) Channelized intersections
      iii) Unchannelized intersections. **(08 Marks)**

Module-4

7 a. i) What are the major sources of traffic related noise pollution? Explain.
      ii) Explain controlling methods of noise pollution by traffic. **(08 Marks)**

   b. What are the major air pollutants due to road traffic? Explain consequences of each. **(08 Marks)**

OR

8 a. i) Write various objective of road accidents studies **(04 Marks)**
      ii) Explain in detail the causes for road accidents. **(04 Marks)**

   b. Write short notes on :
      i) Promotion of non – motorized transport
      ii) Measures to decrease accidents. **(08 Marks)**

Module-5

9 a. Define traffic congestion. Explain different method of traffic restrain (reduction). **(08 Marks)**
   b. Explain Intelligent transport system for traffic management. **(08 Marks)**

OR

10 a. Suggest some traffic regulatory measures suitable for urban areas. **(08 Marks)**
    b. Write short notes on :
       i) Requirement of good pricing system
       ii) Travel demand management
       iii) Area traffic control
       iv) Traffic system management. **(08 Marks)**

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