Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 80209

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Fifth Semester

Civil Engineering

CE 6501 — STRUCTURAL ANALYSIS – I

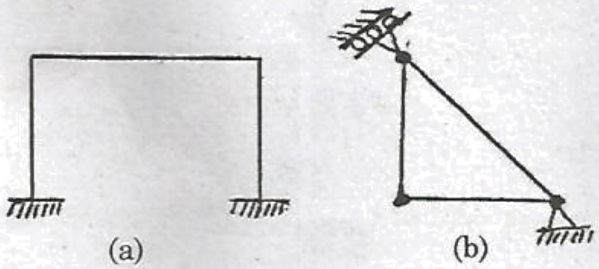
(Regulations 2013)

Time : Three hours | Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Find the degree of static indeterminacy for the following structures and specify whether the structure is stable or not.



(a) (b)

2. Determine the prop reaction of a propped cantilever using energy method when it is subjected to a uniformly distributed load over the entire span.

3. What are the uses of influence lines?

4. State: Muller Breslau's principle.

5. What is the value of horizontal thrust at the supports of a three hinged symmetrical parabolic arch of span "l" and central rise 'h', when it is subjected to a uniformly distributed downward load "w" per unit horizontal length over the right half span?

6. Name any two methods available for the analysis of two hinged arches.

7. Write the generalized form of slope – deflection equation with necessary explanation.

8. A propped cantilever of span 6 m is subjected to a uniformly distributed load of 6 kN/m over the entire span. Using slope deflection method, determine the slope at B. Take the flexural rigidity EI as 9000 kN-m^2.

9. A continuous beam ABC of length 2L (with uniform flexural rigidity EI) is simply supported at the ends A and C and continuous over the support B at mid-length. Using moment distribution method, determine the moment at the support B, if it subjected to a uniformly distributed load 'w' throughout the length.

10. What is meant by distribution factor?

PART B — (5 × 16 = 80 marks)

11. (a) The frame shown in figure Q.11 (a) is pin jointed to rigid supports at A and B and the joints C and D are also pinned. The diagonals AD and BC act independently and the members are all of the same cross sectional area and material. ABC and BCD are equilateral triangles. Using energy method, find the forces in all the members if a load of 5 kN is hung at D.

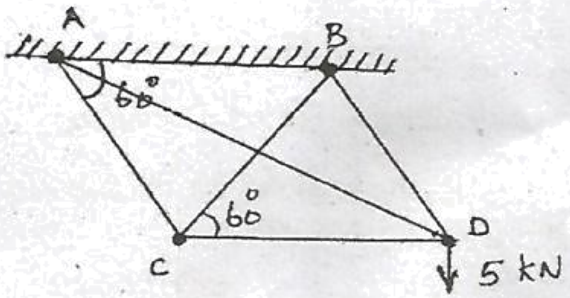


Fig Q. 11 (a)

Or

(b) Using consistent deformation method, determine the horizontal reaction at the support C for the frame shown in figure Q.11 (b). Flexural rigidity EI is constant for both the members.

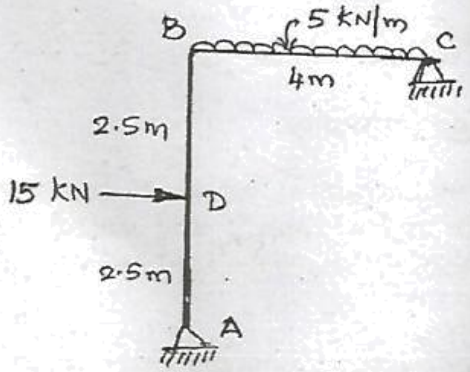


Fig Q. 11 (b)

12. (a) A continuous beam ABC is simply resting on supports A and C, continuous over the support B and has an internal hinge (D) at 3 m from A. The span AB is 7 m and the span BC is 10 m. Draw influence lines for reactions at A and B.

Or

(b) Draw influence line for shearing force at 4 m from the propped end of a propped cantilever of span 7 m. Calculate the ordinates at every 1 m.

13. (a) A three hinged parabolic arch of span 20 m has its crown 9 m high from the left support and 4 m higher than the right support. The crown of the arch is at a horizontal distance of 12 m from the left support and 8 m from the right support. The arch is subjected to a uniformly distributed load of 3 kN/m over a length of 14 m from the right support. Find the horizontal thrust and bending moment at a horizontal distance of 4 m from the right support.

Or

(b) Find the reaction components at the supports of a symmetrical parabolic fixed arch 20 m span and 3 m central rise when it is subjected to a uniformly distributed load of 2 kN/m over the left half span.

14. (a) A continuous beam ABC is simply supported at A, fixed at C and continuous over support B. The span AB is 6 m and carries a concentrated load of 60 kN at its mid-span and the span BC is 8 m and carries a uniformly-distributed load of 10 kN/m. Take the flexural rigidity for portion AB as 2EI and that for portion BC as EI. Analyze the beam by slope deflection method and draw the shearing force and bending moment diagrams.

Or

(b) Analyze the portal frame shown in Fig.Q.14 (b) by slope deflection method and draw the bending moment diagram.

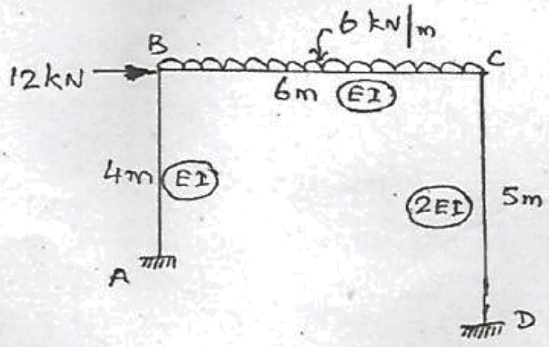


Fig Q. 14 (b)

15. (a) A continuous beam ABC 24 m long is fixed at A, simply supported at B and C. The intermediate support B is at 12 m from A and sinks by 30 mm. The span AB carries a uniformly distributed load of 3 kN/m and the span BC is subjected to a point load of 24 kN at 8 m from C. Analyze the beam by moment distribution method and draw the shearing force and bending moment diagrams. Take the flexural rigidity EI as 40,000 kN-m^2 and is constant throughout.

Or

(b) Analyze the frame shown in figure Q.15 (b) by moment distribution method using Naylor's simplification and draw the bending moment diagram.

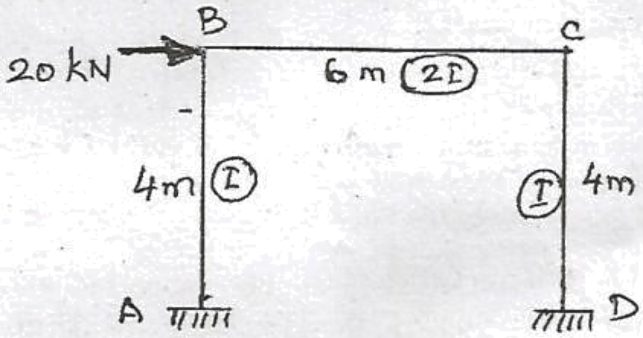


Fig Q. 15 (b)

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Question Paper Code : 80210

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Fifth Semester

Civil Engineering

CE 6502 — FOUNDATION ENGINEERING

(Regulation 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the information obtained in general exploration?
2. What are various methods of site exploration?
3. Define net pressure intensity.
4. List out the methods of computing elastic settlements.
5. Where mat foundation is used?
6. What are the assumptions made in combined footing?
7. What are methods to determine the load carrying capacity of a pile?
8. What is meant by group settlement ratio?
9. Write any two assumptions in Coulomb's wedge theory?
10. Distinguish Coulomb's wedge theory from Rankine's theory.

PART B — (5 × 16 = 80 marks)

11. (a) Describe the salient features of a good sub-soil investigation report. (16)

Or

(b) Explain any two methods of site exploration in detail. (16)

12. (a) Explain Terzaghi's analysis of bearing capacity of soil in general shear failure with assumptions. (16)

Or

(b) Explain different types of shear failures of soil with neat sketch. (16)

13. (a) A trapezoidal footing is to be produced to support two square columns of 30 cm and 50 cm sides respectively. Columns are 6 meters apart and the safe bearing capacity of the soil is 400 kN/m^2. The bigger column carries a load of 5000 kN and the smaller carries a load of 3000 kN. Design a suitable size of the footing so that if does not extend beyond the face of the columns. (16)

Or

(b) Write the IS codal provisions for design of raft foundation. (16)

14. (a) A group of 16 piles of 50 cm diameter is arranged with a center to center spacing of 1.0 m. The piles are 9 m long and are embedded in soft clay with cohesion 30 kN/m. Bearing resistance may be neglected for the piles. Adhesion factor is 0.6. Determine the ultimate load capacity of the pile group. (16)

Or

(b) Explain the method of determining the load carrying capacity of a pile. (16)

15. (a) Explain the Rebhann's graphical method for active earth pressure calculation. (16)

Or

(b) Explain the Rankine's theory for various backfill condition to calculate active state earth pressure. (16)

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Question Paper Code : 80211

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Fifth Semester

Civil Engineering

CE 6503 — ENVIRONMENTAL ENGINEERING — I

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define Design Period.

2. What are the components of public water supply scheme?

3. List functions of intake structure.

4. What are the different types of settling?

5. Differentiate between unit operations and Processes?

6. Distinguish between coagulation and flocculation?

7. What are the methods for Deflouridation?

8. How to remove iron from water?

9. What is the function of service reservoir?

10. What are the different methods of leak detection in a water distribution network?

PART B — (5 × 16 = 80 marks)

11. (a) (i) The population of 5 decades from 1930 to 1970 are given in table. Find out the population after one, two and three decades beyond the last known decade by any 3 methods? (10)

Year :	1930	1940	1950	1960	1970
Population :	25000	28000	34000	42000	47000

(ii) Discuss the various factors that influence the water demand of a community. (6)

Or

(b) (i) Explain Membrane filter technique. (8)

(ii) What are the factors to be considered in the selection of source for a water supply scheme? How does the quality of ground water differ from surface water? (8)

12. (a) (i) In a water supply scheme to be designed for serving a population of 4 lakhs, the storage reservoir is situated at 8 km away from the city and the loss of head from source to city is 16 metres. Calculate the size of supply main by using Weisbach formula as well as Hazen's formula assuming a maximum daily demand of 180 litres per day per person and half of the daily supply to be pumped in 8 hours. Assume the coefficient of friction for the pipe material as 0.012 in Weisbach formula and $C_H = 130$ in Hazen's formula. (10)

(ii) Explain the factors to be considered for selection of pumps. (6)

Or

(b) (i) Explain the working of a reservoir intake with a neat sketch. (8)

(ii) Explain briefly the steps involved in water supply pipeline installation. (8)

13. (a) (i) How many kg of bleaching powder with 25% available chlorine is required daily to treat 5 MLD of water with 3 mg/L of chlorine? (6)

(ii) With the help of neat sketch explain function and operation of slow sand filter. (10)

Or

(b) (i) Explain the design principles of flash mixer and flocculator. (8)

(ii) Design a clarifier for a population of 60000 persons. Percapita demand is 150 Lpcd. Peak demand 180% of average demand. Assume suitable data if necessary. (8)

14. (a) Explain the different methods of Water softening. (16)

Or

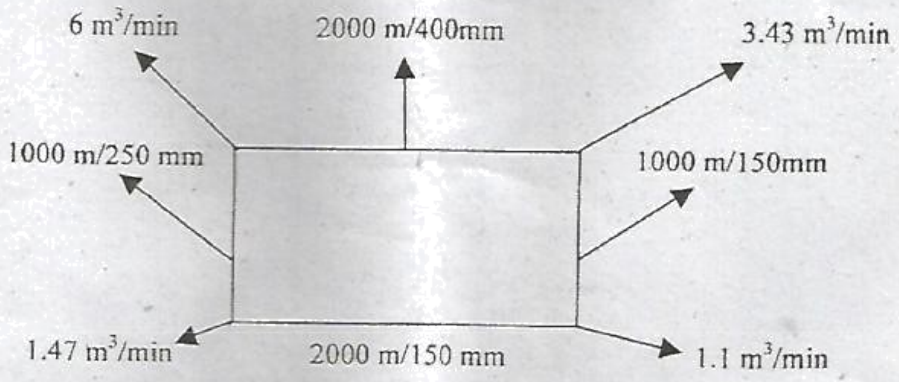
(b) Write a note on :

(i) Prasanthi techniques (5)

(ii) Reverse osmosis (5)

(iii) Nalgonda technique. (6)

15. (a) Analyse the pipe network shown below and tabulate the flow values in each of pipe. (16)



Or

(b) (i) Enumerate some of the appurtenances required for the pipes of water distribution networks. (10)

(ii) What are the requirements of good distribution system? (6)

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Question Paper Code : 80212

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Fifth Semester

Civil Engineering

CE 6504 — HIGHWAY ENGINEERING

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Define central road fund.
2. What are classified roads in Nagpur plan?
3. What are the fundamental principles of alignment?
4. What are the types of sight distance?
5. What are the Requirements of an ideal pavement?
6. Define Equivalent radius of resisting section
7. What is the significance of CBR test?
8. Define elongation index.
9. Define Bleeding.
10. Differentiate Pumping and Ravelling.

PART B — (5 × 16 = 80 marks)

11. (a) Explain Jayakar committee recommendations.

Or

(b) Explain in detail the various factors affecting the design of highway location.

12. (a) Explain the Types of gradient.

Or

(b) A road has a total width of 7.5 m including extra widening on curve and design speed of 60 kmph. Calculate the length of transition curve and its shift on this curve of 200 m radius. Allowable super – elevation is 1 in 150 and pavement is rotated about centerline.

13. (a) Design the pavement for construction of a new two lane carriageway for design life 15 years using IRC method. The initial traffic in the year of completion in each direction is 150 CVPD and growth rate is 5%. vehicle damage factor based on axle load survey = 2.5 std axle per commercial vehicle. Design CBR of subgrade soil=4%.

Or

(b) Explain the design procedure for rigid pavements.

14. (a) What are the Different forms of bitumen.

Or

(b) Explain the California Bearing Ratio Test.

15. (a) What are the possible causes for longitudinal cracking?

Or

(b) Explain in detail about any four methods of strengthening of pavements.

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Question Paper Code : 80213

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Fifth Semester

Civil Engineering

CE 6505 — DESIGN OF REINFORCED CONCRETE ELEMENTS

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Write any two advantages of limit state method over elastic method.
2. What is the formula used to find the actual neutral axis in working stress method?
3. On what circumstances doubly reinforced beams are to be adopted?
4. Write any two general features of two way slab?
5. What is the important mechanism of shear resistance in beams with web reinforcement?
6. Define flexural bond and anchorage bond.
7. Write any two reinforcement provision in columns.
8. What is the salient condition for minimum eccentricity of column?
9. Define punching shear.
10. Enumerate proportioning of footings.

PART B — (5 × 16 = 80 marks)

11. (a) Explain the codal recommendations for limit states design? State their significance. (16)

Or

(b) Design a rectangular section for a simply supported reinforced concrete beam of effective span of 4 m carrying a concentrated load of 35 kN at its mid span. The concrete to be used is of grade M 20 and the reinforcement consists of Fe 415 steel bars.

(i) Self weight of beam is ignored.

(ii) Self weight of beam is considered. Use working stress method. (16)

12. (a) Design a T-beam section with a flange width of 1200 mm, a flange depth of 100 mm, a web width of 250 mm and an effective depth of 500 mm, which is subjected to a factored moment of 550 kNm. The concrete mix is to be used is of grade M20 and steel is of grade Fe415. Use limit state method. (16)

Or

(b) Design a slab over a room 5 m × 7m as per I.S. code. The slab is supported on masonry walls all round with adequate restraint and the corners are held down. The live load on the slab is 330 N/m². The slab has a bearing of 150 mm on the supporting walls. (16)

13. (a) Design a shear of rectangular reinforced concrete beam section to carry a factored bending Moment of 220 kNm, factored shear force of 140 kN, and a factored torsional moment of 80 kNm. Use M20 grade concrete and Fe415 steel. (16)

Or

(b) A simply supported RC beam of size 300 × 500mm effective is reinforced with 4 bars of 16 mm diameter HYSD steel of grade Fe415. Determine the anchorage length of the bars at the simply supported end if it is subjected to a factored force of 350 kN at the centre of 300 mm wide masonry support. The concrete mix of grade M20 is to be used. Draw the reinforcement details. (16)

14. (a) Design a column having an effective length of 4.50 m to support a factored load of 1600 kN. Consider the reinforcement ratio p to be in the range 1.5 to 2.0 percent and the effective cover to longitudinal steel of 55 mm. The materials to be used are M25 grade of concrete and HYSD steel bars of grade Fe415. (16)

Or

(b) A braced reinforced concrete column of circular cross-section of 500mm diameter is to support a factored axial load of 2300 kN along with a factored moment of 165 kNm. The unsupported length of the column is 6.3 m with effective length of 5.5m. Design the column when it is to be provided with :

(i) lateral ties and

(ii) spiral reinforcement. The M25 grade of concrete and HYSD steel bars of grade Fe415. (16)

15. (a) A 230 mm thick masonry wall is to be provided with a reinforced concrete footing on a site having soil with SBC, unit weight and angle of repose of 130 kN/m², 17.5 kN/m³ and 30° respectively. The M20 grade of concrete and HYSD steel bars of grade Fe 415. Design the footing when the wall supports at service state: a load of 150 kN/m length. (16)

Or

(b) A Rectangular column 550 × 350 mm carries a load of 775 kN. Design a rectangular footing to support the column. The safe bearing capacity of the soil is 210 kN/m². Use M15 grade concrete. (16)

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12. (a) Describe the different types of bonds in brick masonry with sketches.

Or

(b) Explain the different types of joints in buildings with sketches.

13. (a) Explain the various types of sheet piles.

Or

(b) Explain in detail about tunneling techniques.

14. (a) Describe in detail about shell roof structures.

Or

(b) Explain about the support structures required for heavy equipments and conveyors.

15. (a) Explain the various equipments for pile driving.

Or

(b) Mention the various types of compaction equipment. Mention their uses.