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320551(20)

B. E. (Fifth Semester) Examination, April-May/Nov.-Dec. 2020

(New Scheme)

(Civil Engg. Branch)

STRUCTURAL ANALYSIS-II

(Theory)

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *Attempt all questions. Part (a) from each question is compulsory. Attempt any* **two** *parts from parts (b), (c) and (d) of each question.*

Unit-I

1. (a) Explain principle of superposition'. 2

(b) Analyse the continuous beam shown in fig. (a). Using three moment equation and draw the bending moment diagram. 7

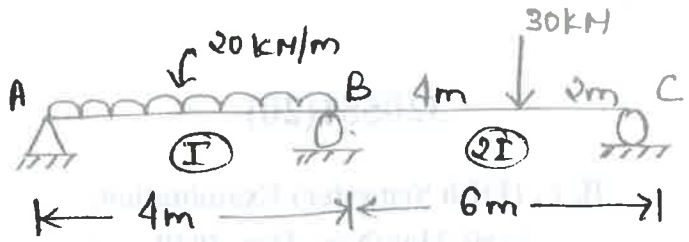

Fig. (a)

(c) Analyse a moments of a continuous beam shown in fig. (b) using three moment equation and draw shear force and Bending moment diagram. Take *EI* constant. 7

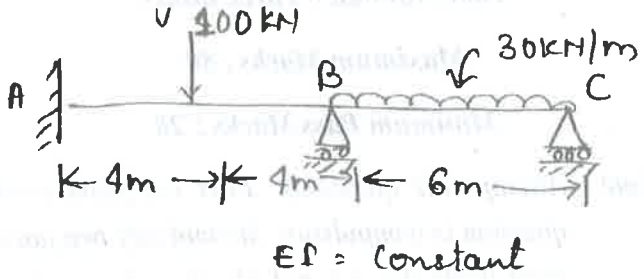

Fig. (b)

(d) Using the method of consistent deformation, determine for the beam given in figure (c) the reaction R_B treating it as the redundant. *EI* is constant. 7

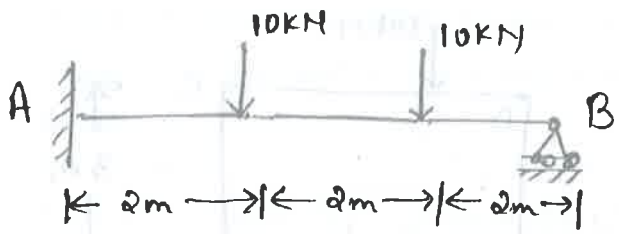

Fig. (c)

Unit-II

2. (a) What do you understand by lack of fit in trusses? 2

(b) Determine vertical deflection at point *C* of the frame using strain energy method. Take $E = 200$ GPa and $I = 1 \times 10^8$ mm^4 fig. (d). 7

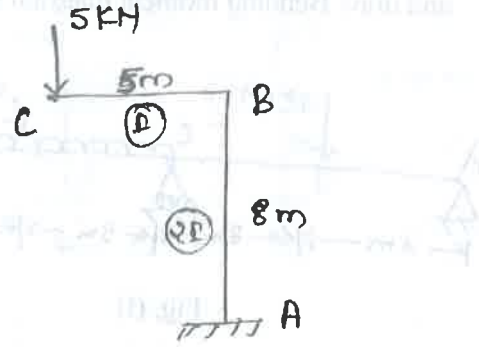

Fig. (d)

(c) Analyse the frame shown in fig. (e) by strain energy method and plot the bending moment diagram. 7

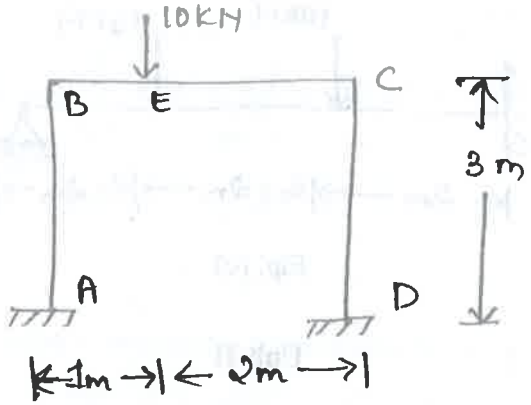

Fig. (e)

(d) Using strain energy method, draw the bending moment diagram, indicating values at salient points and draw Bending moment diagram fig. (f). 7

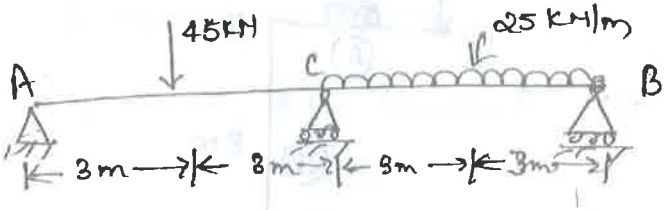

Fig. (f)

Unit-III

3. (a) Define distribution factor used in moment distribution method. 2

(b) Analyse the frame shown below fig. (g) using moment distribution method and plot the bending moment diagram. 7

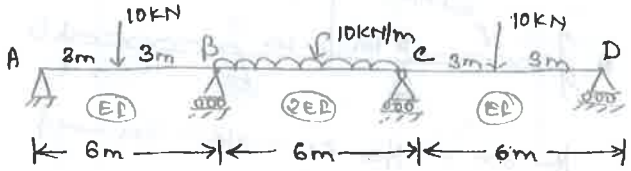

Fig. (g)

(c) Analyse the symmetrical portal frame shown in fig. (h) below using moment distribution method. Draw bending moment and shear force diagram. 7

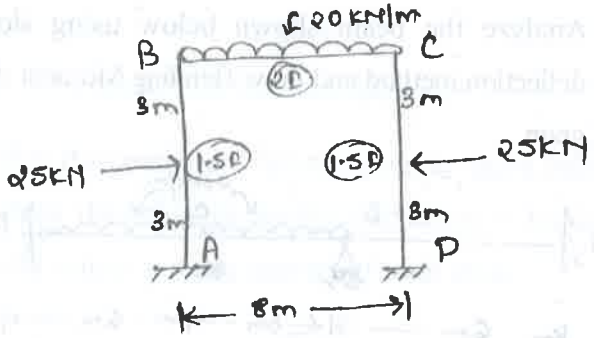

Fig. (h)

(d) Determine the support moments for the continuous beam as shown in fig. (i) using moment distribution method. Under the load support B sinks by 2·5

mm. Take $I = 350 \times 10^{-6}$ m^4 and $E = 200 \times 10^6$ kN/m^2 for all members. 7

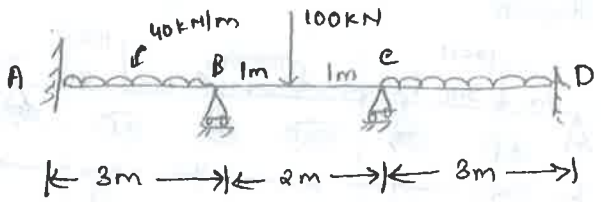

Fig. (i)

Unit-IV

4. (a) Write fundamental equation used in slope deflection method. 2

(b) Analyze the beam shown below using slope deflection method and draw Bending Moment diagram. 7

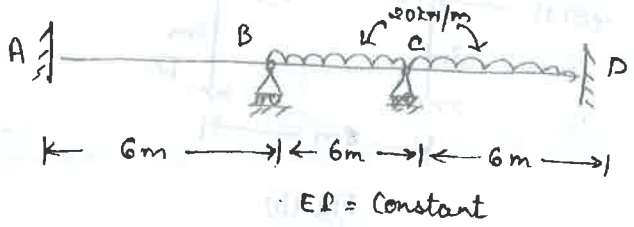

Fig. (j)

(c) Analyze the frame shown in figure by slope deflection method and draw bending moment diagram. 7

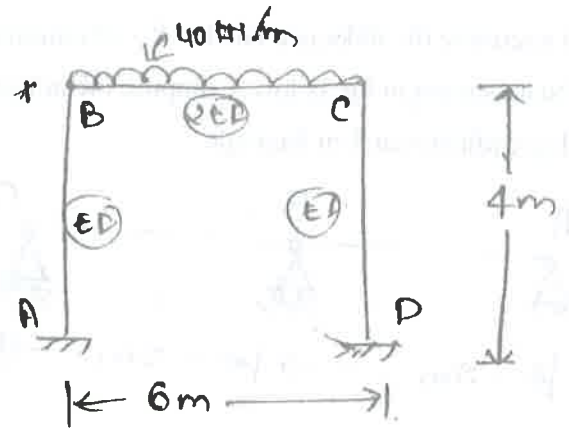

Fig. (k)

(d) What is the basic concept behind the column analogy method? 7

Unit-V

5. (a) Define Muller-Breslau Principles. 2

(b) For the continuous beam shown in figure below, draw the influence line for reaction at A. Indicate the values at every quarter of each span. 7

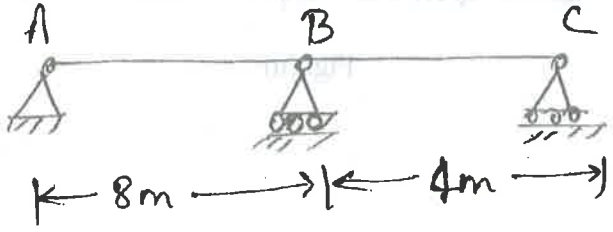

Fig. (*l*)

(c) Determine the influence line for R_A for continuous beam shown in fig. below. Compute the influence line ordinates at 1 m intervals. 7

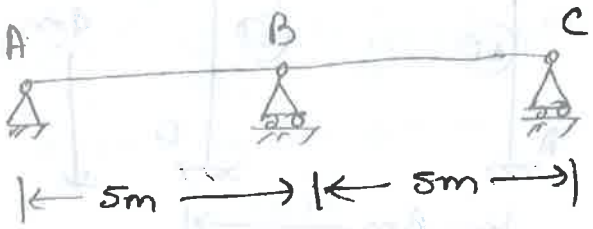

Fig. (m)

(d) Determine the influence line for shown force at D, the mid point of span BC of a continuous beam shown in figure. Compute the influence line ordinate at 1·5 m intervals. 7

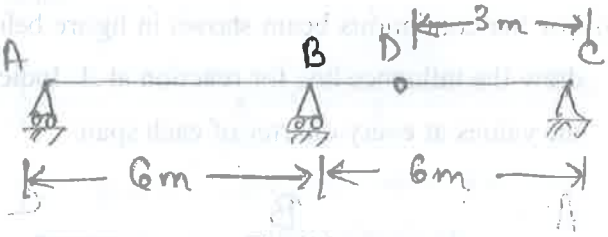

Fig. (n)

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B. E. (Fifth Semester) Examination, April-May/ Nov.-Dec. 2020

(New Course)

(Civil Engg. Branch)

STRUCTURAL ENGINEERING DESIGN-I

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *All questions are compulsory with internal choices among (b), (c) and (d) parts. IS 456 : 2000 is permitted.*

1. (a) Write down two differences between working stress method and limit state method of design. 2

(b) The cross-section of a simply supported reinforced beam is 200 mm wide and 300 mm deep to the center of the reinforcement which consists of 3 bars of 16 mm diameter. Determine the depth of NA and the the maximum stress in concrete when steel is stressed to 120 N/mm^2. Take m = 19. 7

(c) Derive the expressions for moment of resistance of a balanced rectangular section reinforced only in tension, having width b, effective dept d, area of steel A_{st}, and permissible stresses in steel and concrete as σ_{st} and σ_{cbc} respectively. 7

(d) A cantilever beam 3 m span is to carry a superimposed load of 8 kN/m. The beam has a constant cross-section of 300 mm × 500 mm throughout. Determine the tension reinforcement if mild steel bars are to be used. Take unit weight of concrete as 25 kN/m^3. 7

2. (a) Write the minimum grade of concrete for following :

(i) RCC

(ii) RCC exposed to sea water 2

(b) Design a balanced singly reinforced concrete beam section for an applied moment of 60 kn/m. The width of the beam is limited to 175 mm. Use M 20 concrete and Fe 415 steel bars. 7

(c) A reinforced concrete beam has width equal to 300 mm and total depth equal to 700 mm, with a cover of 40 mm to the center of the reinforcement. Design the beam if it is subjected to a total bending moment of 150 kN-m. Use M 20 concrete and HYSD bars of grade 415. 7

(d) Design the reinforcement for a reinforced concrete beam 300 mm wide and 400 mm deep of grade M 20 to resist an ultimate moment of 150 kN-m, using mild steel bars of grade Fe 250. 7

3. (a) Write any two limit state of collapse and two limit states of serviceability. 2

(b) Design a two way slab for a room 5.5 × 4.0 m clear in size if the superimposed load is 5 kN/m^2. Use M 25 concrete and Fe 415 steel. The edges of the slab are simply supported with corners held

down. Also draw a neat diagram of reinforcement detailing. 14

Or

(c) A T-beam has the following data : width of flange = 750 mm, breath of beam = 250 mm, effective depth = 500 mm, thickness of flange = 90 mm. Applied moment = 230 kN-m. Design the beam using M 20 concrete and Fe 415 steel. 14

4. (a) Write down the effective length of following braced and unbraced RC columns for designing :

(i) Fixed at both ends

(ii) Hinged at both ends

(iii) Hinged at one end and fixed at another end

(iv) Fixed at one end and free at another end 2

(b) Design an RCC column of size 450 mm × 600 mm. The axial load under the service load condition is 2000 kN and unsupported length is 3 m. Use M-20 concrete and Fe-415 steel. 7

(c) Design reinforcement for a spiral column of 500 mm diameter subjected to a factored load of 1500 kN. Column has unsupported length of 3·4 m and is braced against side sway. Use M-25 concrete and Fe-415 steeel. 7

(d) Design a tied square short column for factored axial load of 1750 kN, and effective length of 3·5 m. Use M-20 concrete and Fe-415 steel. 7

5. (a) As per IS-456 : 2000 what is the minimum thickness at the edge of footing and the minimum clear cover for footing. 2

(b) Design a dog-legged stair for a building in which the vertical distance between floors is 3·6 m. The stair hall measures 2·5 m × 5 m. The live load is 2·5 kN/m^2. Use M 20 concrete and Fe 415 steel bars. Also neatly draw the reinforcement detailing. 14

Or

(c) Design a rectangular isolated footing of uniform thickness for RC column bearing a vertical load of 600 kN and having a base size of 400 mm × 600

mm. The safe bearing capacity of soil may be taken as 120 kN/m^2. Use M-20 concrete and Fe-415 steel. Also check for one way shear and two way shear. 14

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APR-MAY/NOV-DEC

B. E. (Fifth Semester) Examination, 2020

(New Scheme)

(Civil Engg. Br.)

GEOTECH ENGINEERING-I

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

***Note** : Part (a) of each question is compulsory carrying (2) marks each. Solve any two parts from remaining (b) and (c), (d) carrying (7) marks each.*

Unit-I

1. (a) A soil sample has a void's ratio of 0·66 percent. Calculate porosity. 2

(b) Define liquid limit, liquidity index and consistency index. Determine the value of the liquid limit of a soil from the following test data : 7

No. of blows	:	38	34	25	20
Water content (%)	:	16	17	20	22

(c) A soil sample whose water content is 20% has a bulk density of 2·16 gm/cc. The sample undergoes air drying with insignificant change in void ratio. What is the water content of this sample, when its bulk density is reduced to 2 gm/cc. 7

(d) Prove that : 7

(i) $Y = \frac{(G+es)Yw}{1+e}$

(ii) $Y_{sat} = \frac{(G+e)Yw}{1+e}$

Where :

Y = unit weight of soil

e = void's ratio

s = Degree of saturation

y_w = Unit weight of water

G = Specific gravity

Y_{sat} = Saturated weight of soil

Unit-II

2. (a) What is the meaning of D_{60} and D_{30}? 2

(b) Explain textural classification. 7

(c) Show the Indian Standard Classification for fine grained soils on plasticity chart. 7

(d) Compute the total, effective and pore pressure at a depth of 12 m below the bottom of a lake 6 m deep. The bottom of the lake consists of soft clay with a thickness of max. than 15 m. The average water content for the clay is 40% and the specific gravity of soils may be assumed 2·6 S. Assume that the lake is filled up water upto the top 7

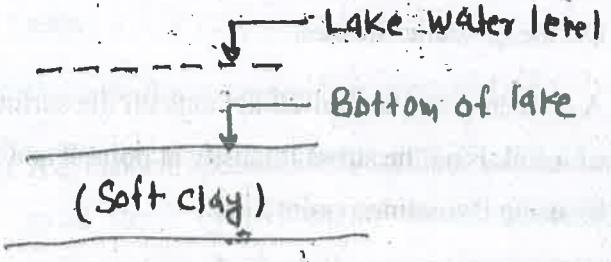


Fig. 2·1.

Unit-III

3. (a) What is zero air voids line? 2

(b) Following data given in table : 7

Soil	Specific gravity	Degree of saturation	OMC
Soil A	2.67	0.80	0.15
Soil B	2.70	0.83	0.18

Which soil is suitable for subgrade layer of soil with respect to dry density.

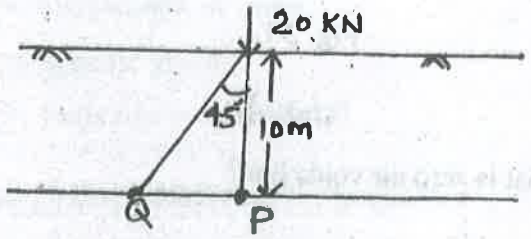
(c) What are the factors that affect compaction? Discuss in brief. 7

(d) Write the name of the permeability test for coarse soil? Derive the equation of this test. 7

Unit-IV

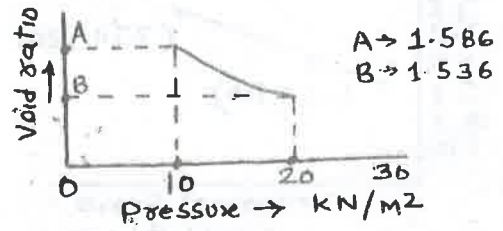
4. (a) Define geostatic stresses. 2

(b) A concentrated load of 20 kN acts on the surface of a soil. Find the stress intensity at point P and Q by using Boussinesq point load. 7



(c) Explain Newmark's influence chart. 7

(d) The graph between pressure and void ratio represents the result of consolidation test : 7



Calculate the value of coefficient of compression and compressibility.

Unit-V

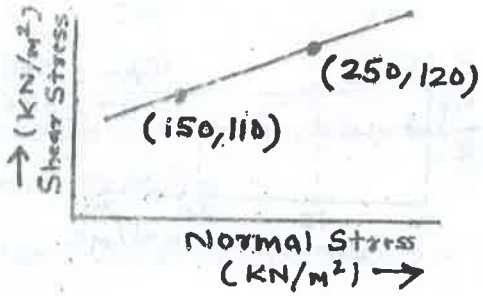
5. (a) What is Coulomb's equation for shear strength of soils. 2

(b) Describe the test procedure of triaxial test. 7

(c) A cylindrical specimen of a saturated soil fails at an axial stress of 167 kN/m^2 in an unconfined compression test. The failure plane makes an angle of 54 with the horizontal. Calculate the shear strength parameters. 7

(d) A direct shear test was carried out on a cohesive

soil sample. The graph below represents the relationship between normal and stress. 7



Calculate the value of cohesion and angle of internal friction.

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B. E. (Fifth Semester) Examination, April-May/ Nov.-Dec. 2020

(New Scheme)

(Civil Engg. Branch)

TRANSPORTATION ENGINEERING-II

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

Note : *All questions are compulsory. Part (a) of each question is compulsory & each carries 2 marks. Attempt any two parts from (b), (c) and (d) of each unit and each carries 7 marks.*

Unit-I

1. (a) What is sleep of soil? 2

(b) Give short notes : 7

(i) Coning of wheels

(ii) Wear of soils

(c) Explain the necessity of sleeper in railway track. What are the requirements of good sleepers? 7

(d) Explain why periodic renewal of ballast is necessary? 7

Unit-II

2. (a) What is Cant Deficiency? 2

(b) Explain the principles of interlocking. Differentiate between ATC and CTC systems. 7

(c) Derive a relationship of super elevation with gauge speed and radius of the curve. 7

(d) Give short notes : 7

(i) Points & Crossings

(ii) Widening & gauge on curves

Unit-III

3. (a) What is free board of bridge? 2

(b) Give short notes : 7

(i) Scoor depth

(ii) Collection of bridge design data

(c) What do you understand by the term economic span of a bridge? Give brief on it. 7

(d) Explain the necessity of site investigation and planning of bridge. 7

Unit-IV

4. (a) What is Tunnelling? 2

(b) Give short notes : 7

(i) Ventilation of tunnels

(ii) Drainage of tunnel

(c) Name the different methods of soft ground tunnelling and describe the American method in detail. 7

(d) Give a brief account on size and shape of railway tunnels. 7

Unit-V

5. (a) What is a natural harbour? 2

(d) Give short notes : 7

(i) Break water jetties

(ii) Ware house

(c) What are Dolphins? Describe various types. 7

(d) Enumerate the key points to decide the layout of a harbour. 7