

Printed Pages – 5

Roll No. :

320651(20)

APR-MAY 2022

B. E. (Sixth Semester) Examination, 2020

(New Scheme)

(Civil Engg. Branch)

STRUCTURAL ENGINEERING DESIGN : II

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

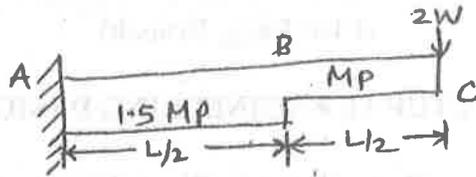
Note : Part (a) of each question is compulsory. Solve any one part from (b) and (c). Use of IS800:2007 and steel table is permitted.

Unit-I

1. (a) Draw the neat sketch of a Idealised stress-strain curve of mild steel and identify the three regions. 2

| 2 |

- (b) (i) Prove that the yielding zone or hinge length of plasticity zone is equal to $1/3$ rd of the span. 14
- (ii) Explain the methods of plastic analysis.
- (c) (i) Calculate shape factor for a square of side a with its diagonal parallel to the z axis. 14
- (ii) Find out the collapse load for the cantilever as shown in figure.



Unit-II

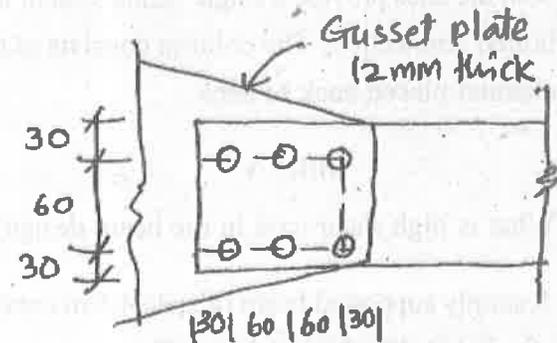
2. (a) What does 4 and 6 imply for the bolts of grade 4.6. 2
- (b) Two plates $180 \text{ mm} \times 10 \text{ mm}$ each are connected by a double cover single bolted butt joint with 16 mm diameter of bolt grade 4.6. The cover plates are 6 mm thick. Determine the strength of the joint. 14
- (c) A tie member of a roof truss consists of 2 ISA $100 \text{ mm} \times 75 \text{ mm} \times 8 \text{ mm}$. The angles are connected to either side of a 10 mm gusset plates

| 3 |

and member is subjected to a tensile force of 300 kN. Design the welded connection. Assume connections are made in workshop. 14

Unit-III

3. (a) Explain shear lag. 2
- (b) Determine the design tensile strength of the plate $120 \text{ mm} \times 8 \text{ mm}$ connected to a 12 mm thick Gusset plate with bolt holes. The yield strength and ultimate strength of the steel used are 250 MPa and 410 MPa. The diameter of the bolt used is 16 mm. 14



- (c) A single angle member carries a factored axial load of 400 kN. Design the member and the connection with the gusset plate 10 mm thick use Fe 410 grade steel. 14

[4]

Unit - IV

4. (a) Why ISHB is preferred for a column section. 2
- (b) An ISHB 400 @ 806.4 N/m is to be used as a column 3.5 m long with both ends restrained against rotation and translation. Determine the design axial compressive strength of the column section. Take $f_y = 250 \text{ N/mm}^2$, $f_u = 410 \text{ N/mm}^2$ and $E = 2 \times 10^5 \text{ N/mm}^2$. 14
- (c) Design a laced column 9 m long to carry a factored axial load of 1200 kN. The column is fixed at both the ends provide a single lacing system with bolted connection. The column consists of two channel placed back to back. 14

Unit - V

5. (a) What is high shear case in the beam design? 2
- (b) A simply supported beam of span 4.5 m consists of a ISLB 450 @ 640 N/m. The compression flange is laterally unsupported. Determine the design bending strength of the beam. 14

[5]

- (c) Design a laterally supported simply supported beam of span 4 m loaded for a concentrated load of 400 kN at mid span. The load is transferred through base plates of 200 mm length to the supports. Check for shear and deflection also. 14

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Roll No. :

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APR-MAY 2022

B. E. (Sixth Semester) Examination, 2020

(New Scheme)

(Civil Engg. Branch)

GEOTECH ENGINEERING–II

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

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

Unit-I

1. (a) What is the difference between total cohesion and mobilized cohesion? 2

- (b) Explain stability analysis of infinite slopes for cohesive soil. 7
- (c) Explain with sketch the concept of Swedish circle method of analysing of slopes. 7
- (d) Give a brief outline on the friction circle method in stability of slopes. 7

Unit-II

2. (a) Depth of tension cracks in purely cohesive soil is : 2

(i) $n = \frac{4c}{r}$

(ii) $h = \frac{2c}{r} + e$

(iii) $h = \frac{8c}{r} + e$

- (b) Compute the intensities of active and passive earth pressure at depth of 8 m in dry cohesion less and with an angle of internal friction of 30° and unit weight of 18 kN/m³. What will be the intensities of active and passive earth pressure if the water level

- rises to the ground level? Take saturated unit weight of sand as 22 kN/m³. 7
- (c) Backfill on retaining wall is cohesionless of density 2.1 g/cc and is of 6.5 m high. The wall slope at an angle 80° to the horizontal and angle of surcharge of the fill is 5°. If the angle of internal friction for the soil is 35° and angle of wall friction is 23°. Find out the total maximum earth pressure by using Rebhann's construction. 7
- (d) Explain Culmann's graphical method. 7

Unit-III

3. (a) Define : 2
- (i) Safe bearing capacity
- (ii) Allowable bearing pressure.
- (b) Explain effect of water table on bearing capacity. 7
- (c) Explain plate load test. 7
- (d) The result of two plate load tests for a settlement of 25.4 mm are given :

Plate diameter	0.305 m	31 kN
Load	0.61 m	65 kN

A square column foundation is to be designed to carry a load of 800 kN with an allowable settlement of 25.4 mm. Determine the size of footing by using Housel method.

7

Unit-IV

4. (a) What is caisson? 2
- (b) Explain various shapes of well. 7
- (c) Explain element of well foundation. 7
- (d) In a 16 pile group, the pile diameter is 45 cm and center to center spacing of the square group is 1.5 m. If $\hat{C} = 50 \text{ kN/m}^2$, determine whether the failure would occur with the pile acting individually, or as a group? Neglect bearing at the tip of the pile. All piles are 10 m long. 7
- Take $m = 0.7$ for shear mobilisation around each pile.

Unit-V

5. (a) What do you mean by CNS soils? 2

- (b) What is an expansive soil? Where is it found in India? What are its generally characteristics. 7
- (c) Explain sources of sub soil contamination. 7
- (d) Explain effect of sub surface contamination. 7

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Roll No.

320653(20)

B. E. (Sixth Semester) Examination, 2020

APR - MAY 2022

(New Scheme)

(Civil Engg. Branch)

ENVIRONMENTAL ENGINEERING - I

Time Allowed : Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

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

Unjt - I

1. (a) What do you mean by per capita demand? 2
- (b) What are the factors affecting design period? 7

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- (c) Discuss briefly the different variations in the rate of water demand. What are the effect of variation in demand of water on design of various units of water supply scheme? 7
- (d) What are intake towers? Differentiate between dry and wet intake towers. 7

Unit - II

2. (a) Inlist the physical properties of water. 2
- (b) Explain in detail chemical properties of water. 7
- (c) Describe different types of settling in brief and prove that the efficiency of sedimentation process is independent of the depth of sedimentation tank. 7
- (d) Determine the quantity of alum required in order to treat 13 million litres of water per day at a treatment plant, where 12 ppm of alum does is required. Also determine the amount of carbon dioxide gas which will be released per litre of water treated. 7

Unit - III

3. (a) Define Filtration. 2
- (b) Explain in details the construction of slow sand filter. 7

- (c) Draw and explain the functioning of horizontal type pressure filter for water purification purpose. 7
- (d) Design a rectangular sedimentation tank to 1 MLD of water. 7

Unit - IV

4. (a) Which are the various types of Hardness? 2
- (b) What are the merits and demerits of lime soda process of water softening? 7
- (c) What is Fluoridation? Why it is essential mainly for softening discuss it logically? 7
- (d) Explain the various methods of distribution system. 7

Unit - V

5. (a) What are various composition of air? 2
- (b) What are causes of air pollution? 7
- (c) Explain the effect of air pollution on man and vegetation. 7
- (d) Explain the plume behaviour under various atmospheric stability conditions. 7

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Roll No. :

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B. E. (Sixth Semester) Examination, 2020
APR - MAY 2022
(New Scheme)

(Civil Engg. Branch)

CONCRETE TECHNOLOGY

Time Allowed ; Three hours

Maximum Marks : 80

Minimum Pass Marks : 28

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

Unit-I

1. (a) Write advantages of concrete. 2

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- (b) What is bogue's compound? Explain in details how each one of the compounds influence the strength and setting properties of cement. 7
- (c) What is Fineness modulus of aggregate? How it can be determined in lab? 7
- (d) Explain Alkali aggregate reaction. 7

Unit-II

- 2. (a) Define workability. 2
- (b) Explain the water reducer admixture with its mechanism. 7
- (c) Discuss by two tests for quality of concrete in fresh state. 7
- (d) Classify admixture. Also write their functions. 7

Unit-III

- 3. (a) What is creep? 2
- (b) Write a brief note on gel space ratio. 7
- (c) What factors promote shrinkage? What precautions will you take to reduce it. 7

- (d) Give short notes on : 7
 - (i) Durability of concrete
 - (ii) Permeability of concrete

Unit-IV

- 4. (a) As per IS : 456-2000, what is the minimum grade of concrete required for R.C.C. work. 2
- (b) Difference between preliminary and trial mixer. 7
- (c) Explain Indian standard recommended method of concrete mix design. 7
- (d) What are the factors to be considered in proportioning of concrete mix design. 7

Unit-V

- 5. (a) What is ready mixed concrete? 2
- (b) What is cold weathering concrete. Describe various effects of cold weathering on concrete. 7
- (c) Give a brief note on super plasticizer concrete. 7
- (d) How high performance concrete is prepared? Discuss properties and factors affecting it. 7

C020611(020)

**B. Tech. (Sixth Semester) Examination,
April-May 2022**

(AICTE Scheme)

(Civil Engg. Branch)

STRUCTURAL ENGINEERING DESIGN-II

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt all questions. Part (a) of each question is compulsory and carries 4 marks. Solve any two parts from part (b), (c) & (d) and carries 8 marks each. Assume suitable data if required. Use of IS800:2007 & Steel table is permitted.

Unit-I

1. (a) How Limit State method of design is differing from WSM?

4

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- (b) Determine the collapse load of a fixed beam with a concentrated load at mid-span as shown in Fig. 1. 8

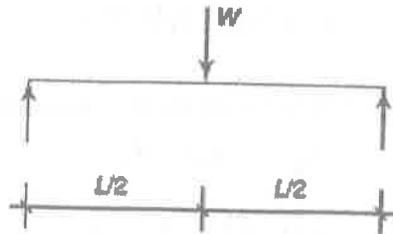


Fig. 1

- (c) Explain the semi-compact, compact section & Plastic Section from moment-rotation curve diagram. 8
- (d) Determine the plastic moment capacity and shape factor of the I-section shown in Fig. 2. This section is ISMB 400 with the root radius omitted. Assume $f_y = 250 \text{ N/mm}^2$. 8

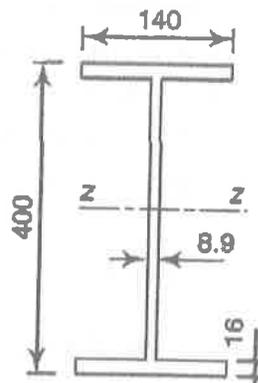


Fig. 2

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[3]

Unit-II

2. (a) Explain with diagram block shear failure. 4
- (b) A tie member consists of an ISA $80 \times 50 \times 8$ mm (Fe 410 grade steel) is welded to a 12 mm thick gusset plate at site. Design weld to transmit load equal to the design strength of the member. Sketch the welded connection. 8
- (c) A tie member of roof truss consists of an ISA $65 \times 65 \times 6$ mm of Fe 410 grade, is welded to an 8 mm gusset plate. Design a weld to transmit a load equal to the full strength of the member. Assume shop welding. Also sketch the details showing length of weld L_1 and L_2 . 8
- (d) Design joint B of roof truss as shown in Fig. 3. The members are connected with 16 mm diameter bolts of grade 4.6 to the gusset plate 12 mm thick. 8

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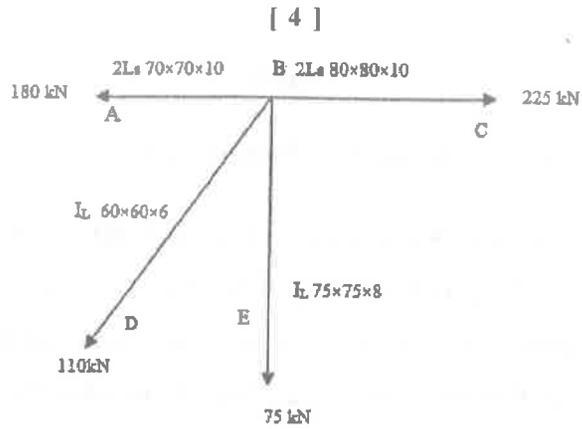


Fig. 3

Unit-III

3. (a) What are the factors affecting the strength of tension member? 4
- (b) Determine the tensile strength of a roof truss diagonal $100 \times 75 \times 6$ mm, $f_y = 250$ MPa connected to the gusset plate by 4 mm welds in Fig. 4. 8

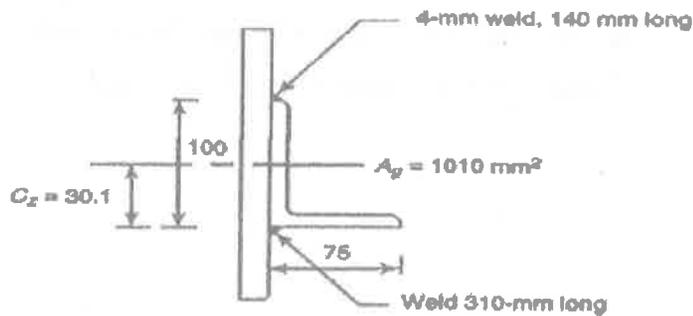


Fig. 4

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[5]

- (c) Select a suitable angle section to carry a factored tensile force of 290 kN assuming a single row of 20 mm diameter bolts and assuming design strength as $f_y = 250$ N/mm². 8
- (d) Design a single angle to carry 350 kN. Assume that the length of the member is 3 m and $f_y = 250$ N/mm². 8

Unit-IV

4. (a) What is lacing and battening in compression member. 4
- (b) Calculate the design compressive load which the member shown in Fig. 5 can support, if the member is of 5.5 m effective length. Use steel of grade Fe 410. 8

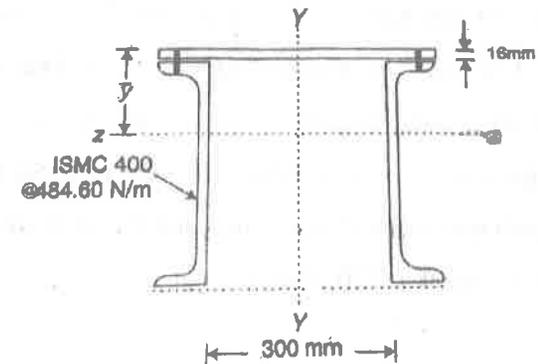


Fig. 5

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[6]

- (c) Design a column to support a factored axial load of 1900 kN. The column has an effective length of 6.0 m with respect to z axis and 4 m with respect to y axis. Use steel of grade Fe 410. 8
- (d) Design a base plate for an ISMB 500 column to carry factored load of 1500 kN. Assume Fe 410 grade steel and M25 concrete. 8

Unit-V

5. (a) Define Flexural member. 4
- (b) Discuss the design procedure of laterally unsupported beam. 8
- (c) Steel beams having a clear span of 9 m are resting on 150 mm wide end bearings. The beams spacing is 3 m and the beams carry a dead load of 5 N/mm², including the weight of the section. The imposed load on the beam is 15 kN/m². The beam depth is restricted to 575 mm and the yield strength of the steel is 250 N/mm². 8

[7]

- (d) A simply supported steel joist of 4.0 m effective span is laterally supported. It carries a total uniformly distributed load of 40 kN (inclusive of self weight). Design an appropriate section using steel of grade Fe 410. 8

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**B. Tech. (Sixth Semester) Examination,
April-May 2022
(AICTE Scheme)**

(Civil Engg. Branch) (BT3020)

ENVIRONMENTAL ENGINEERING

(Part time)

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt all questions. Part (a) of each question is compulsory. Attempt any two parts from (b), (c) and (d). Part (a) carries 4 marks and rest parts carries 8 marks each.

Unit-I

1. (a) What do you mean by per capita demand? 4
- (b) Write physical, chemical and biological characteristics of water in detail. 8

[2]

- (c) Estimate the population of 2051 by GI method from the following data :

Year	Population (Thousands)
1941	40.2
1951	44.5
1961	60.4
1971	75.6
1981	98.9
1991	124
2001	159

- (d) What do you mean by water demand? Discuss in detail about various water demands.

Unit-II

2. (a) What is break point chlorination?
- (b) Design a plain sedimentation tank to treat 3 million of water litres per day. So as to settle at least 75% of the particles of grain size 0.002 cm or more. Assume any suitable data required.
- (c) A sample of raw water contains, 200 mg/l alkalinity 50 mg/l hardness as CaCl_2 and 75 mg/l hardness as

[3]

MgSO_4 . Compute the quantities of lime and soda required to treat 1 million litres of water. If slaked lime of 85% purity is available in place pure lime, what will be the required quantity of slaked lime?

- (d) Discuss the common troubles during operation of rapid gravity filter and how they are removed.

Unit-III

3. (a) How will you estimate the quantity of water to be stored in the distribution reservoir?
- (b) What are the requirements of a good distribution system? Also explain the different layouts used for distribution network.
- (c) Calculate the velocity of flow and corresponding discharge in a sewer of circular section having diameter equal to 1m, laid at a gradient of 1 in 500. The sewer runs at 0.6 depth. Use Manning's formula take $N = 0.012$.
- (d) Explain the treatment mechanism in a septic tank with neat sketches. What are the precautions that should be taken while constructing the septic tank to ensure its efficiency.

[4]

Unit-IV

4. (a) Define suspended growth process and attached growth process.
- (b) Determine the size of a high rate trickling filter for the following data :
- (i) Sewage flow = 5 MLD
 - (ii) Recircular ratio = 1.5
 - (iii) BoD of raw sewage = 230 mg/l
 - (iv) BoD removal in primary clarifier = 30%
 - (v) Final effluent BoD desired = 25 mg/l
- (c) Write short notes on the following : (any **two**)
- (i) Activated sludge process
 - (ii) Facultative legoon
 - (iii) Oxidation ditch
- (d) Explain the help of a flow chart, various processes involved in sludge treatment.

Unit-V

5. (a) Differentiate "Effluent irrigation" and "Sewage Farming".

5
[31]

- (b) Explain the term deoxygenation, reoxygenation, oxygen deficit and the oxygen sag curve with the help of the neat sketch.
- (c) Write a short note on self purification of polluted streams.
- (d) Give the characteristics of the waste from a paper and pulp mill. How do you treat the waste water? Explain with the help of a flow diagram.

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Roll No. :

C020613(020)

B. Tech. (Sixth Semester) Examination, April-May 2022

(Scheme : AICTE)

**ENGINEERING ECONOMICS, ESTIMATING
and COSTING**

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

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

Unit-I

1. (a) Define Estimation. 2
(b) Describe different types of estimate. 9
(c) Write short note on : $3 \times 3 = 9$

[2]

- (i) Contingencies
 - (ii) Work charge establishment
 - (iii) Layout plan
- (d) Explain the purpose of estimation. 9

Unit-II

2. (a) Explain detailed estimate. 2
- (b) Figure 2.1 represents the plan and section of the foundation wall (after removal of earth) of a building internally measuring 3 m × 2.5 m.

Estimate the quantities of

- (i) Earthwork in excavation in foundation
- (ii) lime concrete in foundation,
- (iii) Brickwork in foundation and plinth. 9

(Figure 2.1 on page no. 6)

- (c) Estimate the quantities and cost of earth was for a road between two stations A to B with the following data :

Width of the road 10 meter at formation surface and size slope 2 : 1 Rate for earthwork in banking and cutting may be taken as rupees 10 per cubic

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meter including leap up to 150 meter with a condition that portion of earthwork available from cutting is to be utilized for banking within the same lead of 150 meter the data of field book for the portion of road has below : 9

Chainage	0	1	2	3	4	5	6
Reduced level	123.90	125.00	124.60	122.90	121.60	121.00	120.40
Formation level	123.20	123.60	124.00	123.60	123.20	122.80	122.80

1 chain = 30 m

- (d) Determine the quantities of earthwork for the portion of a road between chainages 50 and 60 from the following data, lengths being measured with a standard 20 m chain. 9

Chainage	Ground level
50	131.1
51	131.2
52	130.9
53	131.2
54	130.8
55	130.7
56	130.6

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57	130.4
58	129.1
59	129.5
60	129.7

The formation level at chainage 50 is 130.0 and a road is in a raising gradient of 1 : 100, the width of formation is 10 m and the side slope 1.5 : 1 in embankment and 1 : 1 in cutting. The lateral slope of the ground may be assumed as level. Calculate also the cost of this earthwork in bank and the cutting at prevailing rate.

Unit-III

3. (a) Define Rate Analysis. 2
- (b) Calculate the rate of cement concrete 1 : 5 : 10 per cubic meter with graded brick ballast (jhama chips) 40 mm down in foundation 9
- (c) Calculate the rate of R.C.C. works 1:1.5:3 per cubic meter for beam with 2.0% of steel. 9
- (d) Calculate the rate of first class brick work per cubic meter in lime and surkhi mortar (1:3 in foundation and plinth.) 9

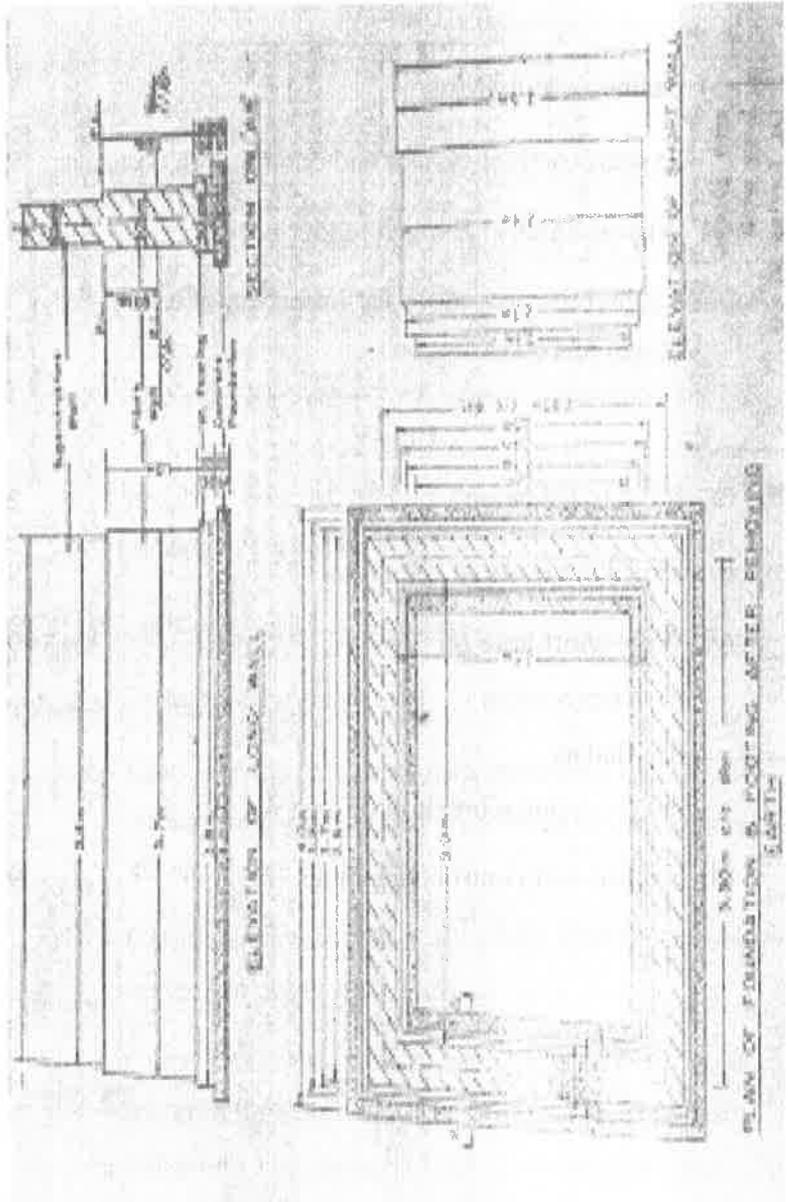
[5]

Unit-IV

4. (a) Define Security Money. 2
- (b) Explain contract system and condition of contract. 9
- (c) What is Tender? Explain tender notice. 9
- (d) Explain the procedure for invitation of tender for design and construction. 9

Unit-V

5. (a) What is Valuation? 2
- (b) Explain purpose of valuation. 9
- (c) Write short note on : 3 × 3 = 9
- (i) Depreciation
- (ii) Budget
- (iii) Percentage breakup of cost
- (d) Explain cost control techniques. 9



C020631(020)

**B. Tech. (Sixth Semester) Examination,
April-May 2022**

(AICTE Scheme)

(Civil Engineering Branch)

STRUCTURAL ANALYSIS by MATRIX METHOD

Time Allowed : Three hours

Maximum Marks : ~~80~~ 100

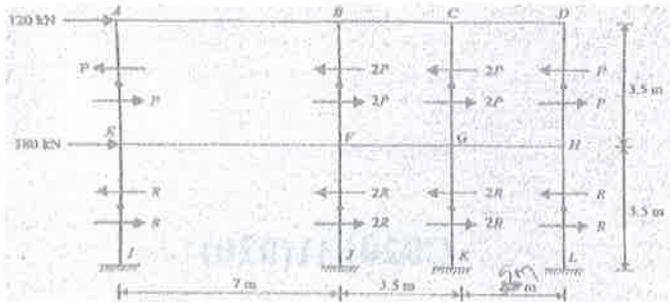
Min. Passing Marks 35

Note : Attempt all questions.

Unit-I

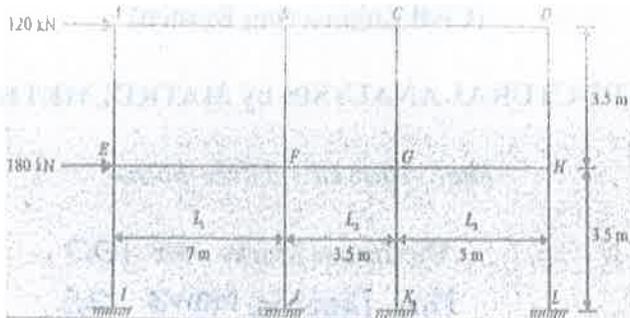
1. (a) Write assumption made in cantilever method of approximate method. 24
- (b) Analyse the building frame, subjected to horizontal forces as shown in figure use Portal method. 16

[2]



Or

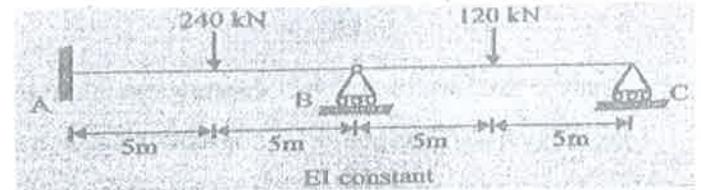
Analyse the structure given in fig. by using cantilever method assuming that all the column have the same area of cross-examination.



Unit-II

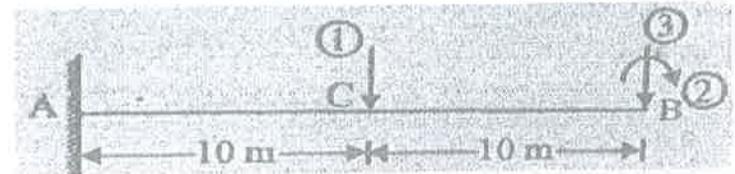
2. (a) Why flexibility method is called force method. 24
- (b) Analyse the continuous beam shown in figure. 14/16

[3]



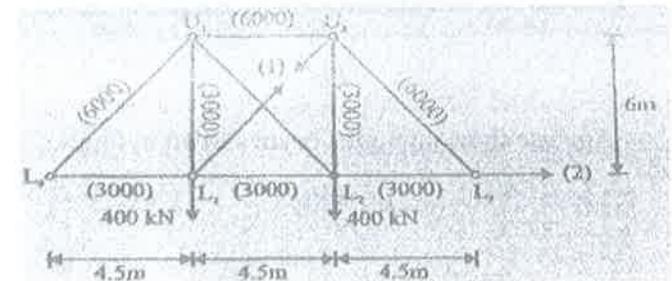
Or

Develop the stiffness matrices for the AB beam with reference to the coordinates shown in figures.



Unit-III

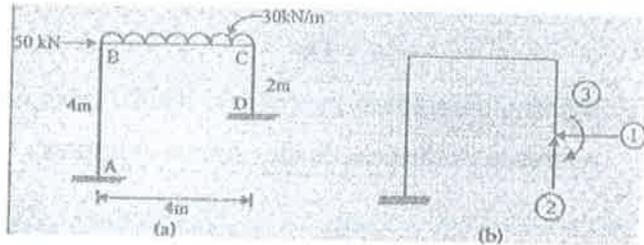
3. (a) Write any three properties of stiffness matrix. 24
- (b) Develop the flexibility matrix for the pin jointed plane frame with reference to coordinate 1 and 2 shown in figure the numbers in parentheses are the cross sectional areas of the members in mm². 14/16



[4]

Or

Analyse the portal frame $ABCD$ shown in figure by flexibility matrix method. EI is constant through out.



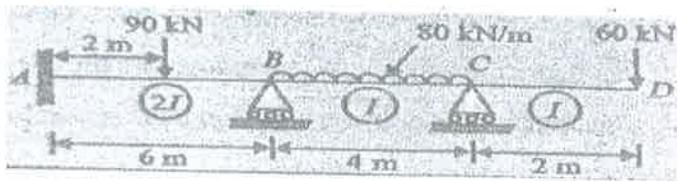
Unit-IV

4. (a) Explain constant strain triangle (CST).

24

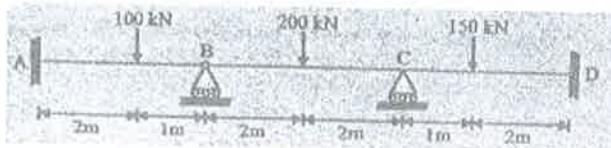
(b) Analyse the beam shown below by stiffness matrix method.

14/16



Or

Analyse the continuous beam shown in figure



[5]

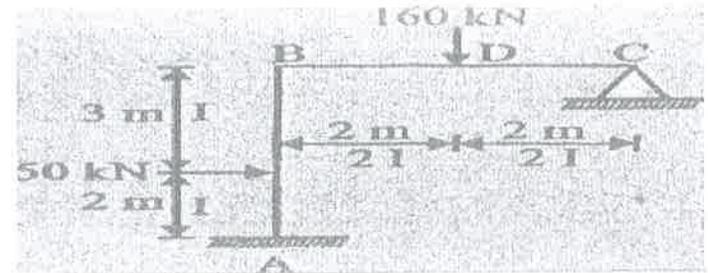
Unit-V

5. (a) Explain collapse mechanism and write types of mechanism.

24

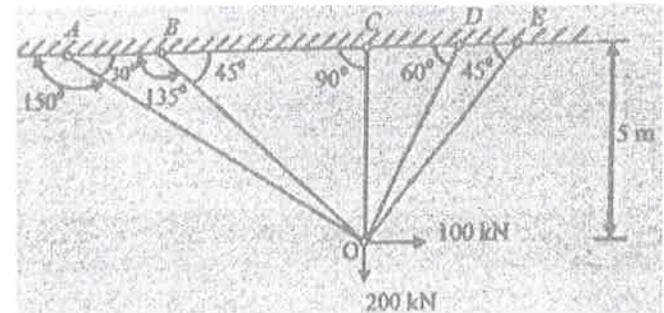
(b) Analyse the structure shown in figure.

14/16



Or

Analyse the pin-jointed structure shown in figure. The cross section area of each member is 2000 mm^2 . Take $E = 200 \text{ kN/mm}^2$



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**B. Tech. (Sixth Semester) Examination,
April-May 2022**

(AICTE Scheme)

(Civil Engg. Branch)

CONCRETE TECHNOLOGY

(Elective)

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : All questions are compulsory. Attempt part (a) of each question and any two parts from (b), (c) and (d). Distribution of marks : Part (a) 4 marks, and part (b), (c) and (d) 8 marks each.

Unit-I

1. (a) What are the basic qualities of mixing and curing water?

[2]

- (b) Define Hydration of cement. Explain structure of hydrated cement paste.
- (c) What do you understand by Alkali aggregate reaction? Also explain factors affecting AAR.
- (d) What are the various methods of combining aggregates?

Unit-II

- 2. (a) Explain Segregation and Bleeding in concrete.
- (b) What is workability of concrete? What are the different factors which affect workability?
- (c) What is Admixture in concrete? Explain mineral admixture with example.
- (d) Explain compaction factor test with the help of neat sketch.

Unit-III

- 3. (a) Explain the concept of 'maturity' in concrete.
- (b) Discuss the factors causing plastic shrinkage, drying shrinkage and carbonation Shrinkage.

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- (c) What do you understand by permeability of concrete? What are the causes/reasons of permeability of concrete and how it can be reduced?
- (d) What is creep of concrete? Explain in detail.

Unit-IV

- 4. (a) What are the principles of concrete mix design?
- (b) Explain in detail the non-destructive testing of concrete using Rebound hammer.
- (c) Design a concrete mix for heavily reinforced section, using IS Code 10262 : 2019 guidelines. Assume other conditions yourself.
- (d) Difference between Destructive & Non-Destructive testing of concrete.

Unit-V

- 5. (a) What do you understand by special concrete? What is need of special concrete?
- (b) Explain with appropriate sketches how a 'tremie' is used to place concrete underwater.

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- (c) Explain Vacuum dewatered concrete with the help of suitable diagram.
- (d) Explain Self-compacted concrete, its properties and use.

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**B. Tech. (Sixth Semester) Examination,
April-May 2022**

(AICTE Scheme)

(Civil Engg. Branch)

TRAFFIC ENGINEERING and MANAGEMENT

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : Attempt all questions. Part (a) of each question is compulsory and carries 4 marks. Solve any two parts from part (b), (c) & (d) and carries 8 marks each.

Unit-I

1. (a) Define PCU.

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- (b) Explain mechanical methods of traffic forecast.
- (c) Problems due to mixed traffic and other conditions in developing countries.
- (d) Explain the factors on which PCU values depend.

Unit-II

2. (a) Explain AADT.
- (b) Enumerate the different methods of carrying out traffic volume studies. Indicate the principal of each.
 - (c) Define the terms basic capacity, possible capacity and practical capacity and its importance in traffic engineering in detail.
 - (d) Explain the fundamental diagrams of traffic flow and derive a relationship between flow, speed and density.

Unit-III

3. (a) What are the objectives of accident studies?
- (b) Write a note on lightening layouts for highways and intersection.

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- (c) What are the causes of road accidents and discuss how each of these factors leads to accident and its preventive measures.
- (d) Explain with neat sketch (i) Condition diagram (ii) Collision diagram, and its use in accident studies.

Unit-IV

4. (a) Define Traffic Engineering.
- (b) What is Traffic Rotary? What are its advantages and limitations in particular reference to traffic conditions in Chhattisgarh?
 - (c) What do you understand by traffic signs? Classify them with their neat sketches.
 - (d) Explain how the points of traffic conflict are reduced by introducing one way streets.

Unit-V

5. (a) In a one-lane one-way homogeneous traffic stream, the observed average headway is 3.0s. The flow (expressed in vehicles/hr) in this traffic stream is?

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- (b) A pre-timed four phase signal has critical lane flow rate for the first three phases as 200, 187 and 210 veh/h with saturation flow rate of 1800 veh/h/lane for all phases. The lost time is given as 4 seconds for each phase. If the cycle length is 60 seconds, the effective green time (in seconds) of fourth phase is?
- (c) An isolated three-phase traffic signal is designed by Webster's method. Theoretical flow ratios for three phases are 0.2, 0.3 and 0.25 respectively, and lost time per phase is 4 seconds. The optimum cycle length (in seconds) is?
- (d) Explain the Webster's approach for the design of a fixed time traffic signal.