QP Code : **14886**

(3 Hours) [Total Marks : 80

N.B. (1) Question No. **1** is **compulsory**.
(2) Attempt any **three** questions out of remaining **five** questions.
(3) Assume any other **data** if **required**.
(4) Illustrate your answers with neat **sketches** wherever **required**.

1. Attempt any **four** :— 20
   (a) What roles do transport infrastructure of a country play ? Enlist the different modes of transport and their characteristics.
   (b) Write short notes on: Transit sheds and ware houses.
   (c) On a particular track, the speeds of various trains are : 10 trains at 50kmph, 8 trains at 55kmph, 4 trains at 60 kmph. Calculate the weighted average speed and find out its deviation from the maximum speed.
   (d) What is the necessity of visual aids in connection with airport ? Name the different visual aids.
   (e) Draw a layout of an airport having 2 intersecting runway. Show the markings on it.

2. (a) It is observed that at present tracks, are mostly laid with Flat-footed rails. Give reasons for this preference in relation to other types of rail section. 8
   (b) Calculate and show it in diagram the elements required to set out a 1 in 8·5 turnout with switch angle of 1°34'27". Use the IRS method. 12

3. (a) Explain the necessity of sleepers in railway track. Using sleeper density of M+6, estimate the quantity of track material required for constructing a B.G railway track that is 6 km long, if the length of the rail is 13 m. 10
   (b) Briefly discuss the various steps involved in the construction of a new B.G railway line. 10

4. (a) What is the ballast ? Why it is used in the railway track ? Briefly describe the various types and its advantages, disadvantages and suitability. 10
   (b) Calculate actual length of runway required if basic length obtained is 1000 m. The airport is located at an elevation of 120m. Mean of average daily temperature is 38°C and the Mean of Maximum daily temperature is 47°C. Longitudinal section details are given below 10

End to end of runway (m)	Gradient(%)
1 to 400	+1%
400 to 800	−0·8%
800 to 1200	+0·6%

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GN-Con. 8740-14.

5. (a) Explain various factors affecting size of Apron. Draw a neat sketch showing the basic parking configurations of aircrafts.   10

    (b) Determine the capacity of 12 gates that serve three classes of aircraft using the following aircraft mix and average gate occupancy time.   10

Aircraft Class	Mix(%)	Average Occpancy Time (min)
1	50	25
2	35	45
3	50	60

6. The average wind data collected at a particular site is giVen below. Determine the calm period, the pest orientation of runways and the total wind coverage along the direction of EW, and NS by using Wind rose diagram Type IT. Permissible cross wind component is 25 kmph.   20

| Wind data			
Wind direction	Duration of wind		
	6.4-25 (kmph)	25-50 (kmph)	50-75 (kmph)
N	7.4	2.7	0.2
NNE	5.7	2.1	0.3
NE	3.4	0.9	0.5
ENE	1.2	0.4	0.2
E	0.8	0.2	0.0
ESE	0.3	0.1	0.0
SE	4.3	3	0.0
SSE	5.5	3.2	0.0
S	9.7	4.6	0.0
SSW	6.3	3.2	0.5
SW	3.6	1.8	0.3
WSW	1.0	0.5	0.1
W	0.4	0.1	0.0
WNW	0.2	0.2	0.0
NW	5.3	1.9	0.0
NNW	4.0	1.3	0.3

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(3 Hours)   Total Marks : 80

N. B. : (1) Question **No. 1** is **compulsory.**
     (2) Attempt any **three** questions out of remaining questions.
     (3) Figures to the right indicate **full** marks.
     (4) Assume suitable data if needed but justify the same.

I.   (a) Determine the degree of static and kinematic in determinacy of the follow-   6
       ing structures.
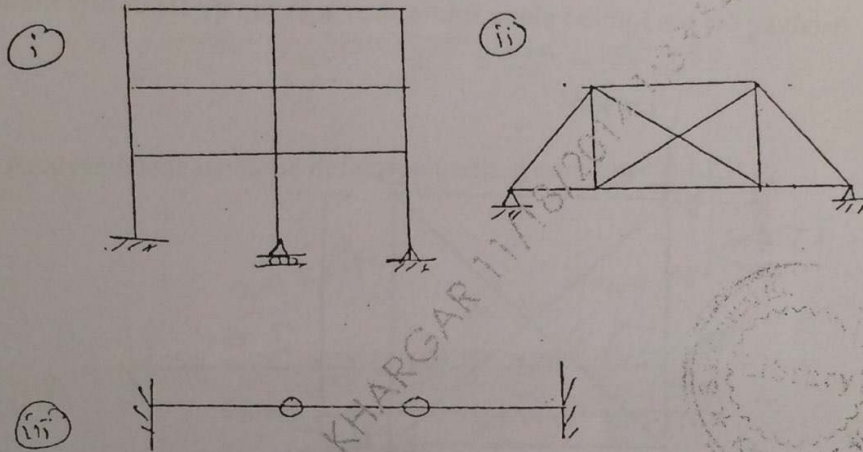
(b) Develop the flexibility and stiffness matrix for prismatic member AB with   10
    reference to the co-ordinates shown in fig.

                                                4
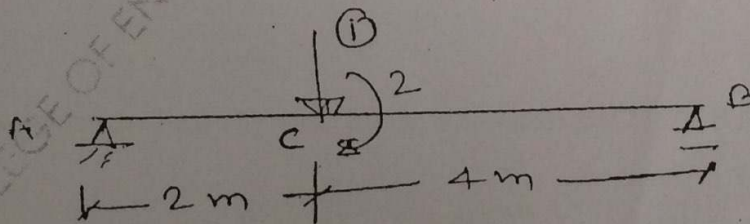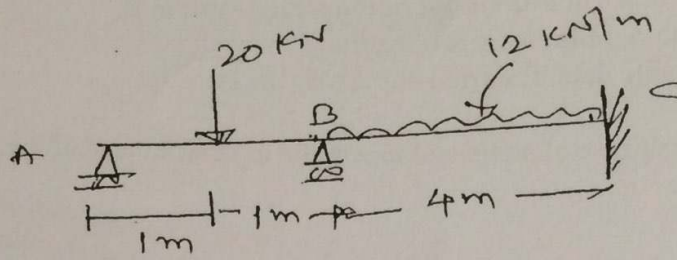
(c) Define the following terms
    (i)   Carry over factor
    (ii) Distribution factor
    (iii) Relative stiffness and modified stiffness

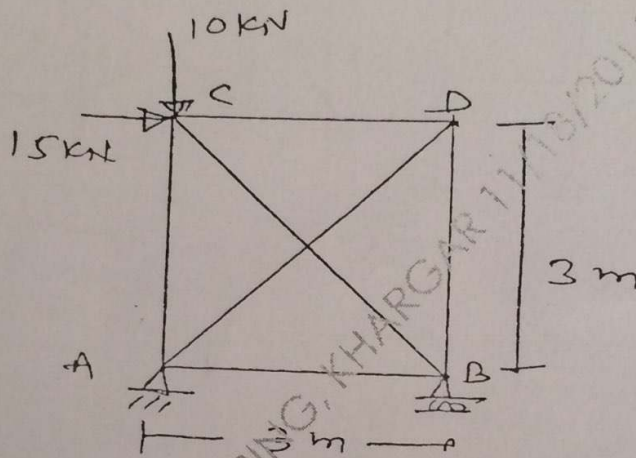GN-Con. 5621-14.   [TURN OVER

2. (a) Analyse the beam by flexibility method and draw BMD 10

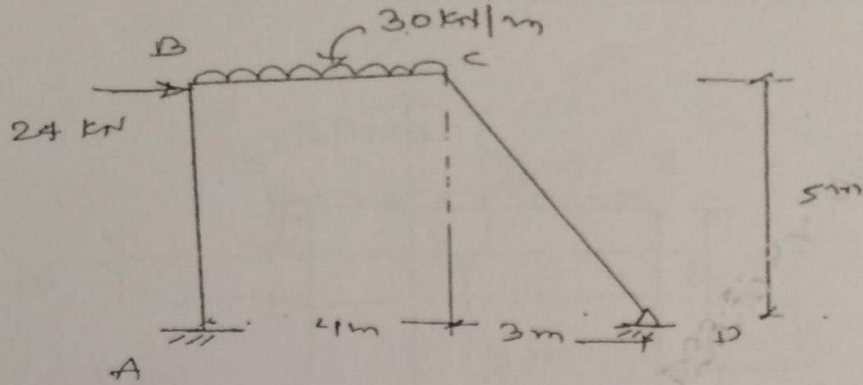(b) Analyse the pin jointed plane frame shown in fig. by flexibility method 10

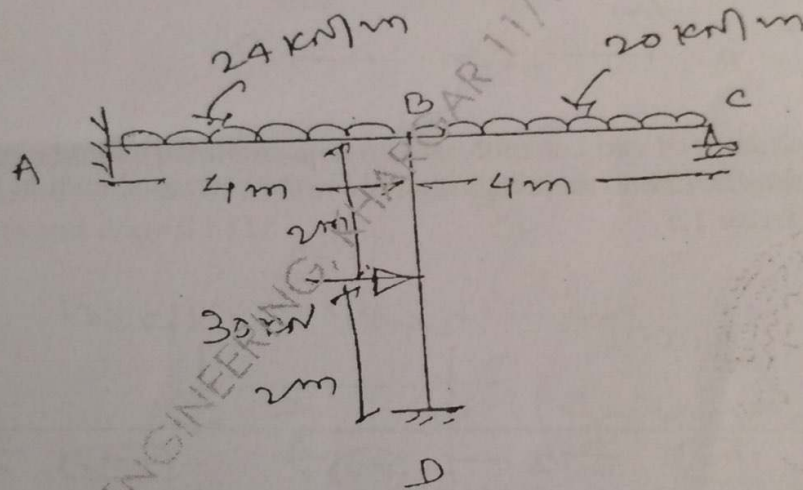3. (a) Analyse the frame and draw BMD by using flexibility method 20

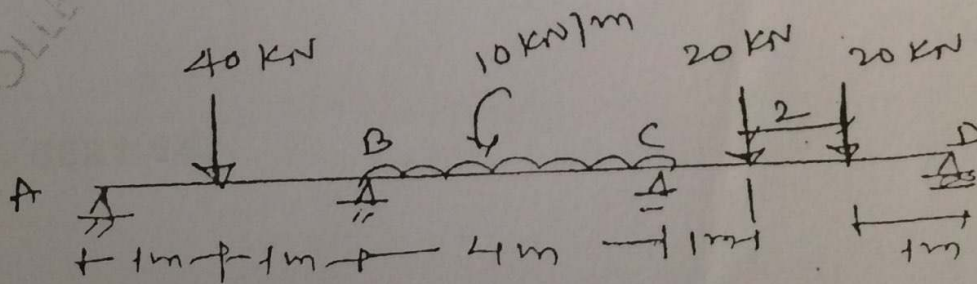**GN-Con. 5621-14.**

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4. (a) Analyse frame by slope defection method and draw B.M.D   12

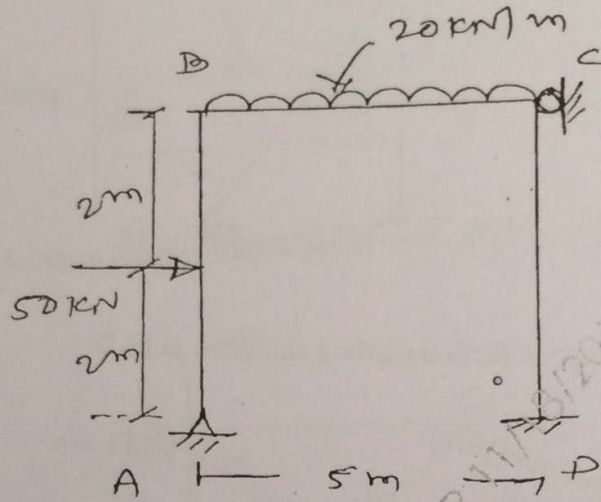(b) Analyse the beam by three moment theorem and Draw B.M.D   8
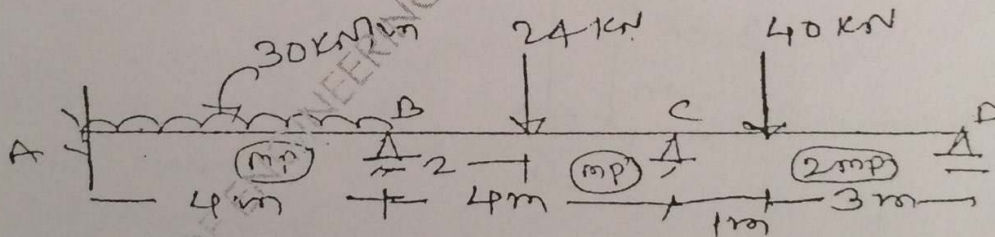

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GN-Con. 5621-14.

5. (a) Analyse the frame by moment distribution method.

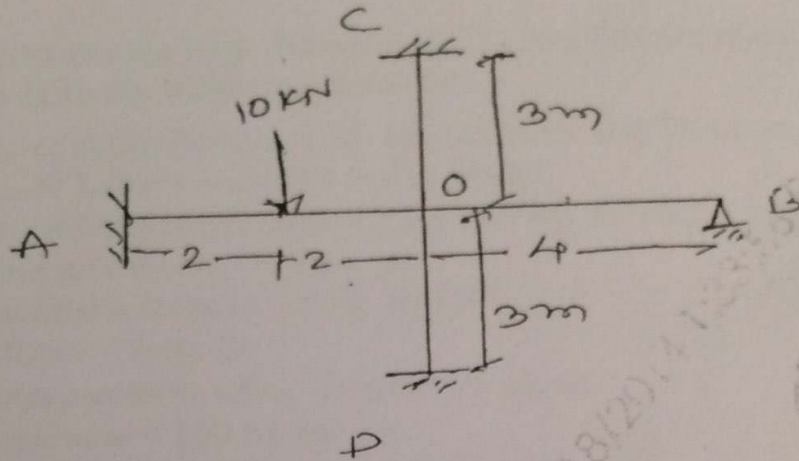(b) Determine the plastic moment capacity for the bean as shown in fig. lake   8
    Load factor 1.5

6. (a) Analyse the frame by stiffness method and dran B.M.D 12

(b) A two hinged parabolic arch of span 40m and rise 10 m carries uniformly 8
distributed 10 ad of 30 k/m on right half span find the reaction at the sup
ports and draw B.M.D.

GN-Con. 5621-14.

QP Code : 14961

(4 Hours)   [Total Marks : 80

N. B. : (1) Question No. 1 is compulsory.
(2) Answer any **three** questions from the remaining questions.
(3) All questions carry **equal** marks.

1. It is proposed to construct a High School Building in a District place as (G+1) R.C.C. framed structure with the following facilities :—

     (i) No. of Class Rooms = 16 no. (each having 75 sq. m. carpet area)
     (ii) No. of Labs = 3 no. (60 sq. m. each)
     (iii) No. of Drawing Rooms = 3 no. (60 sq. m. each)
     (iv) Computer Room = 75 sq. m.
     (v) Principal's Room = 60 sq. m.
     (vi) Office = 75 sq. m.
     (vii) Library-cum-Reading Room = 75 sq. m.
     (viii) Gymkhana = 100 sq. m.
     (ix) Canteen = 60 sq. m.
     (x) Indoor Games = 100 sq. m.

Assume Floor to Floor height as 3.6 m. Provide adequate passages, Staircases, Toilets/Sanitary units as per the bye-laws.
Draw the following according to some suitable scale.

GROUND FLOOR PLAN   20

2. Draw the sectional Elevation for the building you have planned in Q. No. 1.   20

3. Draw the TWO - POINT PERSPECTIVE for the building you have planned in   20
Q. No. 1. Assume the Eye-level at 2.0 m. from Ground Level.

4. (a) Draw the ONE - POINT PERSPECTIVE for a WORKSHOP with the following   15
data :
SIZE OF WORKSHOP = 25 m. × 12 m.
Height of workshop = 4.5 m.
(Excluding pitched roof)
Eye-level from Ground Level = 2.0 m.
Plinth Level = 0.6 m.

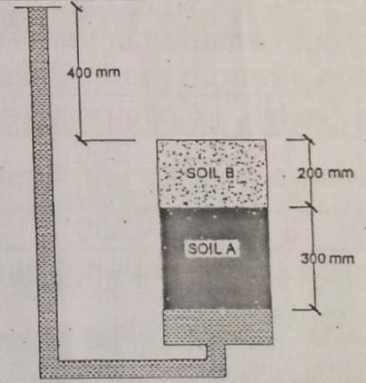   5

(b) Write notes on "GREEN BUILDING" concept.

(OLD COURSE)

QP Code : 12168

(3 Hours)

[Total marks : 100

N.B	(1) Question No. 1 is compulsory. (2) Answer any four out of remaining six questions. (3) Figures to the right indicate full marks assigned to the questions. (4) Draw neat labeled sketches wherever necessary. (5) Assume suitable data if required and highlight the same. (6) Use of natural graph paper and semi-log graph paper is permitted.	
1	Attempt any four of the following :-	
	(a)	Explain: (i) Void ratio, (ii) Porosity (iii) Degree of saturation (iv) Air content (v) Percentage air voids.	5
	(b)	Define the terms: (i) Liquid limit (ii)Plastic limit (iii) Shrinkage limit (iv) Plasticity index and (v) Liquidity index.	5
	(c)	ExplainL: (i) Density index, (ii) Sensitivity, (iii) coefficient of permeability, (iv) Flow index, (v) Consistency index.	5
	(d)	Derive the relation between γ, G, e and S starting from basics.	5
	(e)	One cubic meter of wet soil weights 19.8 KN. If the specific gravity of soil particles is 2.7 and water content is 11%, Find e, γ_d and S.	5
	(f)	Explain quicksand condition and state expression	5
2	(a)	Differentiate between specific gravity of solids and mass specific gravity of soil.	5
	(b)	Water is flowing under a constant head of 400 mm through soil A & B of different permeability as shown in Figure ° 1. The coefficient of permeability of soil A is 4.5 x 10^{-2} cm/sec. If 37.5% of head is lost in flowing through soil A Find the flow velocity and permeability of soil B. Figure 1. (Q2 b)	10
	(c)	Classify the shear tests based on the drainage conditions. How are these drainage conditions realized in the field?	5
3	(a)	Explain with diagram, determination of moisture content by following methods. (a) Oven drying method (b) Pycnometer method (c) Radio activity method (d) Sand bath method	10
	(b)	Differentiate between compaction and consolidation.	5
	(c)	Explain with suitable analogy Terzaghi's theory of one dimensional consolidation of soil	5
4	(a)	The following observations were made in a Standard Proctor's Test. The specific gravity of soil is 2.7. The container is 944 cc in volume. Plot the compaction curve and determine optimum moisture content. Also compute the	1

LM-Con: 11660-14.

		void ratio and degree of saturation at optimum condition.							
		Trial no.	1	2	3	4	5	6	
		Mass of wet soil in kg	1.72	1.85	2.05	1.95	1.92	1.9	
		Water content (%)	7.5	11.5	14.5	17.5	19.5	21.5	
	(b)	Write five points on importance of soil exploration in geotechnical engineering							05
	(c)	Explain classification of soil on the basis of grain size.							10
5	(a)	In a liquid limit test, specimen of a certain sample of clay at water contents of 31.93, 27.62, 25.51 and 23.30 % required 5, 16, 23, and 42 blows respectively to close the standard groove. The plastic limit of the clay is 13%. Natural water content is 18 %. Determine the liquid limit, plasticity index, liquidity index, consistency index, flow index and toughness index of the soil.							
	(b)	Draw typical bore hole and explain various suitable field tests that are conducted during soil exploration at a site having sandy strata,							10
6	(a)	A cylinder of soil fails under an axial vertical stress of 180 kN/m^3 when it is laterally unconfined. The failure plane makes an angle of 55° with the horizontal. Calculate the values of cohesion and the angle of internal friction of soil.							5
	(b)	A clay layer whose total settlement under a given loading is expected to be 14 cm, settles 4cm at the end of one month after the application of load increment. How many month will be required to reach a settlement of 7cm.							7
	(c)	Describe the procedure for finding field consolidation curve for both normally and pre consolidated soils.							8
7	(a)	Explain the factors affecting shear strength of cohesionless soils.							5
	(b)	The following results were obtained from CU test on normally consolidated clay. Plot the strength envelop in terms of total stress and effective stress and determine the strength parameters.							8
	(c)	Briefly describe standard penetration test for cohesionless soil along with corrections applied							7

For 7(b):

Sr. No.	Cell pressure	Deviator stress	Pore pressure
1	250	158	115
2	500	295	225
3	750	458	315

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Te sem -Ⅴ (Rev) Nov- Dec-14
Civil
Sub - GE-I
Date.- 4/12/i,
QP Code : 14921

(3 Hours)   **[Total Marks : 80**

N. B.:
(1) Question No. 1 is compulsory.
(2) Attempt any three from remaining five questions.
(3) Figures to the right indicate the full marks.
(4) Assume any suitable data if not given and justify the same.

Q.1 (A) Mention the scope of Geotechnical Engineering in the design of foundation and underground structures. Write two to three points about both. [05]

(B) Prove that energy supplied to soil in standard proctor test is 592.5 kJoule/m³. [02]

(C) Shear strength of soil is a complex property why? Write three points. [03]

(D) Write two points about aim of one dimensional consolidation test. [02]

(E) Volume of density bottle is less than pycnometer, why? Write three points. [03]

(F) Write four use of particle size distribution curve. [03]

(G) Establish the relationship between porosity, air content and percentage air void. [02]

Q.2 (A) With usual notations show that: $\gamma = \gamma_d + S_r (\gamma_{sat} - \gamma_a)$. [04]

(B) Define shrinkage index, volumetric shrinkage, and shrinkage ratio. [06]

(C) Write source of clay minerals, their types and effects on soil properties. [05]

(D) A sampling tube of 38 mm internal diameter was used to extract a sample of cohesive soil from a test pit. The length of extracted sample was 102 mm and it had a mass of 220 gram and water content of 18%. Find void ratio, porosity, degree of saturation, and percentage air voids. Take G = 2.7. [05]

Q.3 (A) The difference in values of capillary rise for fine sand and silt was found to be 4.5 m. if the capillary rise in fine sand is 0.5 m, compute the difference in size of voids of two soils. [08]

(B) A sand stratum is 10 m thick. The water table is 2 m below ground level. The unit weight of sand layer above and below water table are 17 kN/m³ and 21 kN/m³ respectively. The capillary rise above water table is 1m. Draw the effective stress, pore pressure and total stress diagram for the sand stratum. [10]

(C) Quick sand condition is not possible in coarse grained soil, why? [02]

Q.4 (A) Explain Darcy's law its application in determination of permeability, also explain limitations its use in determination of k. [05]

(B) The discharge through a pervious soil is 216 cc/day The flow net shows 5 flow channels, 10 equipotential drops. The head causing the flow is 2 m. Calculate the permeability of the soil. [05]

(OLD COURSE)   QP Code : **11967**
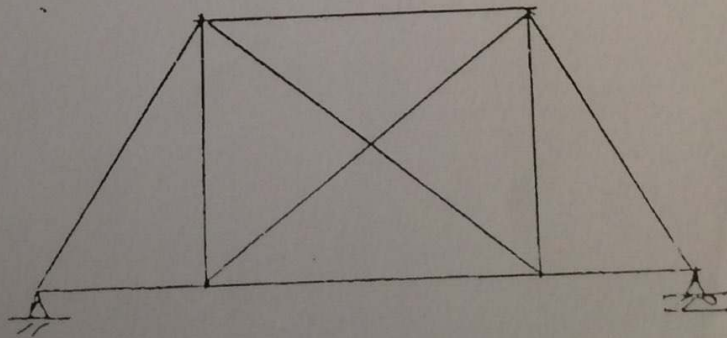
(3 Hours)   [Total Marks : 100

N.B. : (1) Question No. 1 is compulsory.
  (2) Attempt any **four** questions from remaining six questions.
  (3) Assume **suitable** data where ever is **necessary**.
  (4) **Figures** to the **right** indicate **full** marks.

1. (a) Determine the degree of static and kinematic indeterminandcy of the following   6
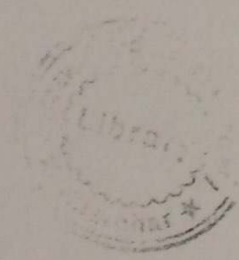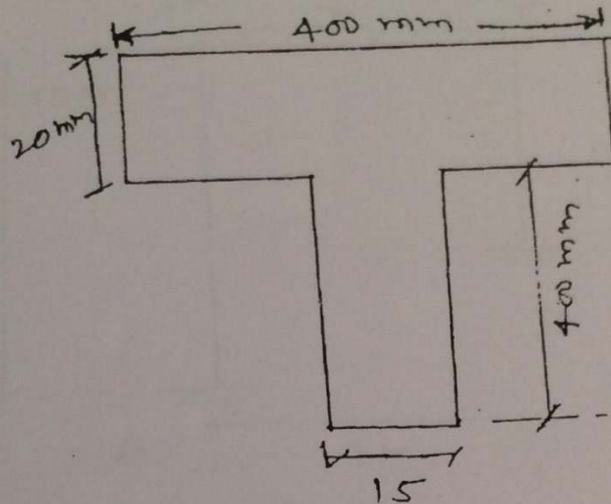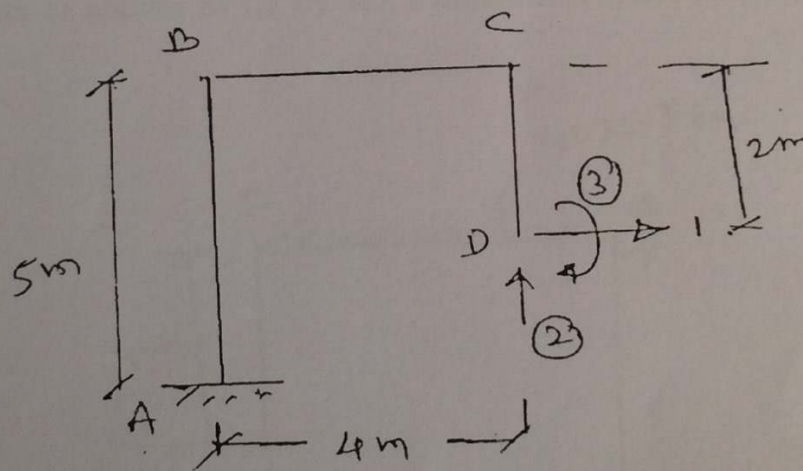   structure. Neglect axial deformation.

i)

ii)

iii)

LM-Con. 5534-14.   [TURN OVER
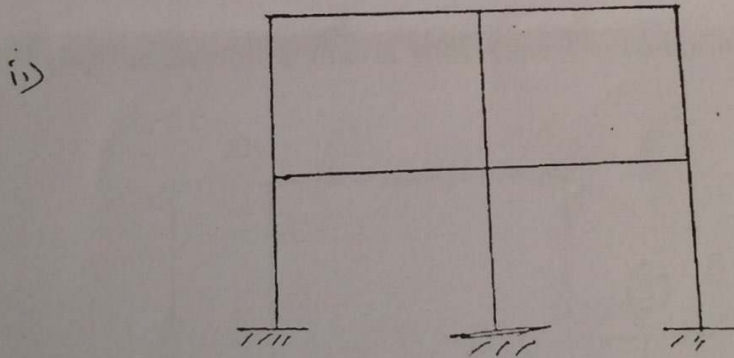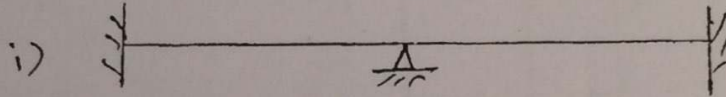
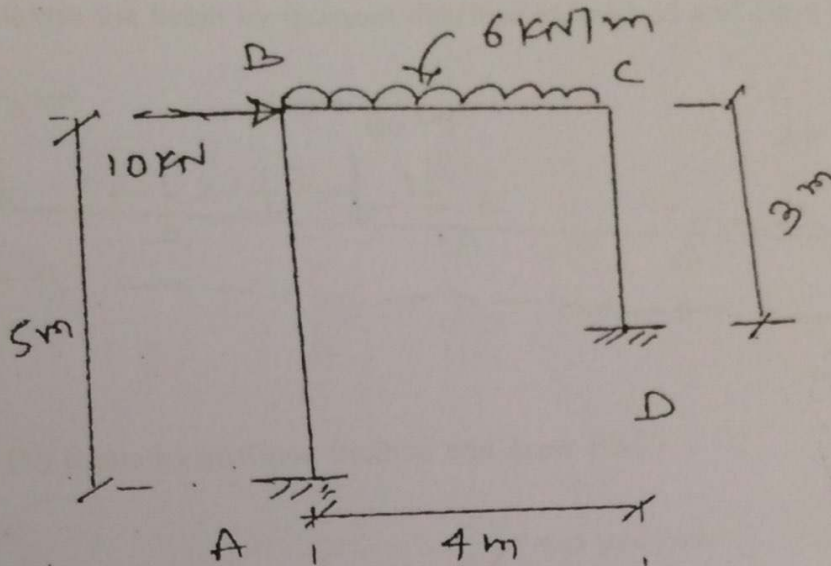(b)   Determine shape factor for the 'T' section as shown in fig.   6

(c)   Develop the flexibility matrix with respect to co-ordinate shown in fig.   8

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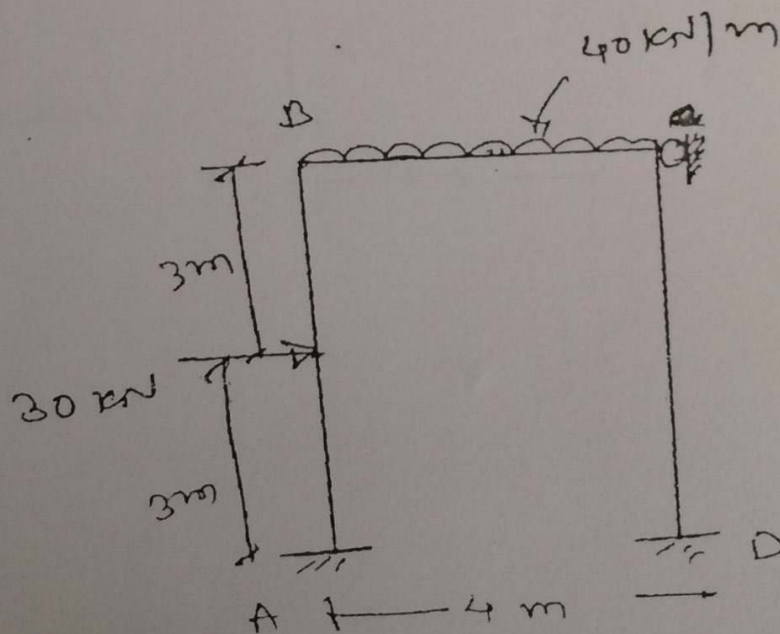
2. Analyse the frame by fiexibility method and draw BMD.   20

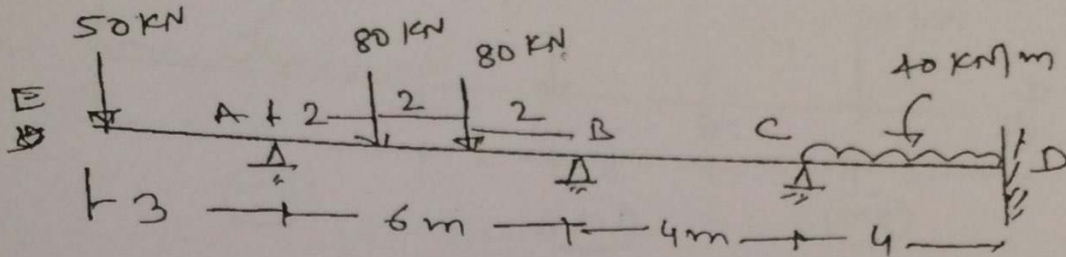3. Analyse the frame as shown in fig by slope deflection method and draw BMD.   20

4. (a) Define the following terms :—   4
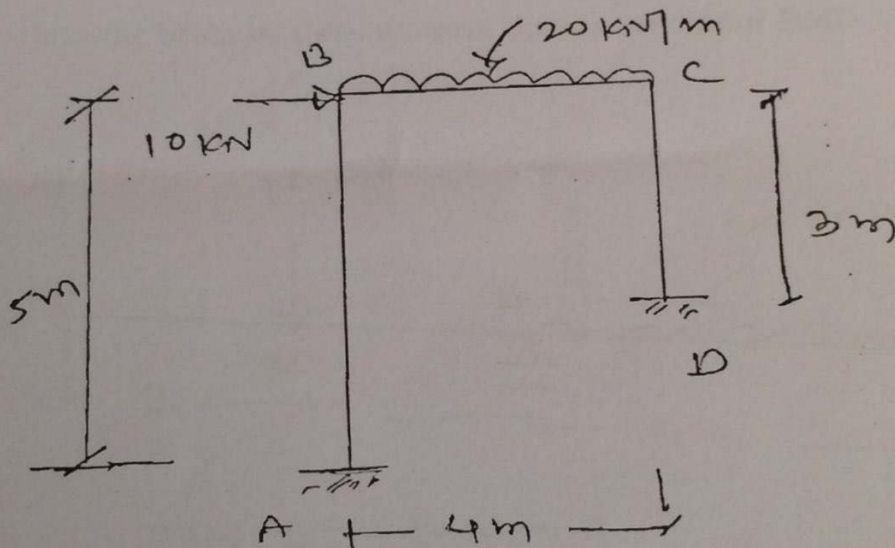   (i) Carry over factor
    (ii) Distribution factor

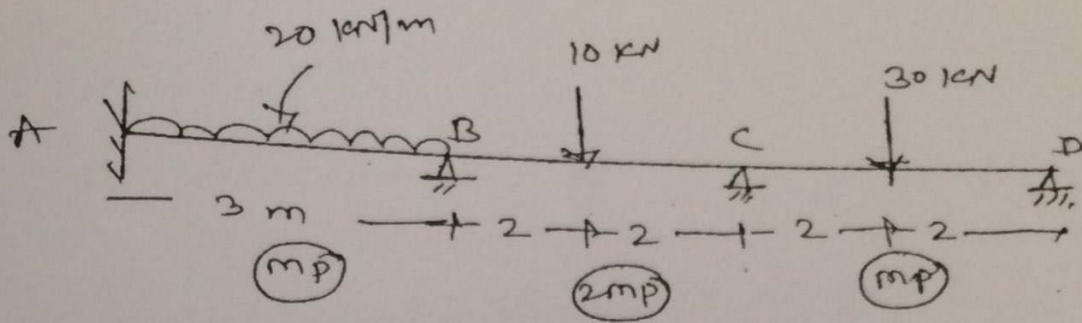 (b) Analyse the beam by moment distribution method and draw BMD.   16

20

5. Analyse the frame by stiffness method and draw BMD.

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6. (a) Determine the plastic moment capacity for the beam as shown in fig. take Load factor 1.5   14

(b) For the rigid Jointed frame as shown in fig. Det. harizontal defiection at D, Assume $\alpha = 12 \times 10^{-6}/°C$ and depth of all members as 400 mm. Neglect the effect of axial forces.   6

7. (a) Analyse the beam by three moment theorem and draw BMD.   12
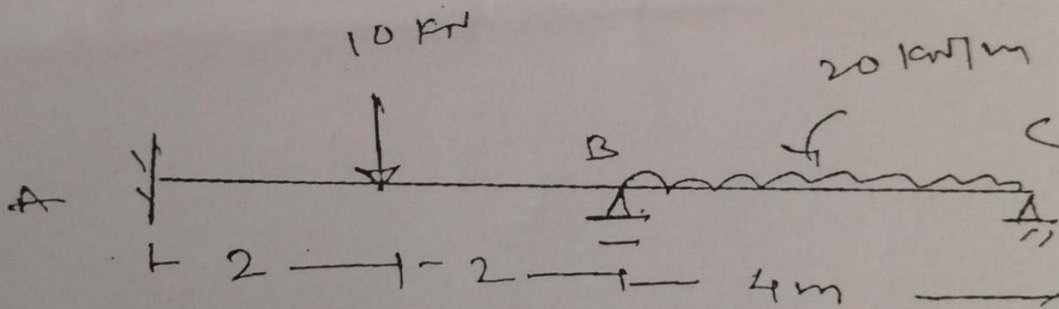
Take EI – constant.

(b) A two hinged parabolic arch of span 30 m and rise 5 m carries u.d.l. of 20 kN/m on left half span find reactions at supports and draw BMD.

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