B. E. (Civil)/Fourth Semester/*Final*

Time: 01:30 hrs.

Full Marks: 40 /Pass Marks: 16

BEG210AR: Fundamentals of Architecture *(New Course)*

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks.

Answer FIVE questions.   **5×8=40**

1. Explain the development of material and construction technology in prehistoric and historic period with sketches.   8

                                        Or,

    Define architecture. Explain why architecture is called Mother of all Arts with examples.   2+6

2. Explain the various types of residential building. What are the various construction system used in building construction?   4+4

3. 'Building design is a systematic and scientific process'. Justify this statement with supportive arguments and examples·   8

4. Define role of urban planning for development of country with its principles.   8

5. Define thermal insulation. What are the passive techniques of thermal insulation for residential building? Explain with sketches.   2+6

6. Write short notes on any TWO: 2×4=8

    (a) Design consideration for airport design

    (b) Influencing factors for architectural development

    (c) Reconstruction and restoration

PURBANCHAL UNIVERSITY
2023

B. E. (Civil)/Fourth Semester/*Final*

Time: 03:00 hrs.   Full Marks: 80 /Pass Marks: 32

BEG259CI: Surveying-II *(New Course)*

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side. Adopt suitably any missing data.

Answer FIVE questions.   5×16=80

1(a) What do you mean by closing error? What are the different methods of balancing the traverse? Explain the Bowditch's Rule.   1+1+4

(b) The following records are obtained in a traverse survey where the length and bearing of the last line were not recorded. Determine the length and bearing of line DA.   10

Line	Length (m)	Bearing
AB	75.50	$30^0 24'$
BC	180.50	$110^0 36'$
CD	60.25	$210^0 30'$
DA	?	?

(a) Derive an expression for the horizontal distance and elevation of a vertical staff if the line of sight is inclined.   6

(b) A tacheometer fitted with anallatic lens and multiplying constant 100 was used to take the following readings on a vertically held staff. The remaining reading could not be observed due to obstruction. Determine the gradient between P and R. Assume other suitable data if needed.   10

From	To	WCB	Vertical angle	Hair reading (m)
Q	P	40^0	$+ 12^0 0'$	4.62, 4.76, **
	R	310^0	$+10^0 0'$	1.69, 2.75, 3.81

3(a) Define contour line. How are contour maps useful to a civil engineer? Describe any one method of contour interpolation. 2+3+3

(b) The following observation were made in order to determine the elevation of the tower. A thedolite was used to measure the distance between the station P and Q and it was found to be 50 m. with station P & Q being in same vertical plane as the tower itself and RL of permanent bench mark being 1250 m. Determine the elevation of the top of the tower and its horizontal distance from station P.   8

Instrument station	Reading on B.M	Angle of elevation
P	2.065m	11°15'
Q	1.815m	17°10'

4(a) What is curve? Define elements of circular curve with figure. What are the advantages of introducing transition curve on circular curve?.   1+4+1

  (b) Set out the simple circular curve by deflection angle method for the following data: 10

  Chainage of IP = 1200 m

  Radius of curvature = 300 m

  External deflection angle = 32°

  Peg interval = 20 m

5(a) What is photogrammetry? What are merits and limitation of photogrammetry?   2+4

  (b) Describe any one method of resection analytically with its derivation.   10

6.   Write short notes on any FOUR: 4×4=16

  (a) Vertical curve

  (b) Triangulation and Trilateration

  (c) Total Station

  (d) Principle of EDM

  (e) GPS and its components

PURBANCHAL UNIVERSITY
2023

B. E. (Civil)/Fourth Semester/*Final*

Time: 01:30 hrs.   Full Marks: 40 /Pass Marks: 16

BEG210AR: Fundamentals of Architecture *(New Course)*

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks.

Answer FIVE questions.   5×8=40

1. Explain the development of material and construction technology in prehistoric and historic period with sketches.   8

Or,

Define architecture. Explain why architecture is called Mother of all Arts with examples.   2+6

2. Explain the various types of residential building. What are the various construction system used in building construction?   4+4

3. 'Building design is a systematic and scientific process'. Justify this statement with supportive arguments and examples.   8

4. Define role of urban planning for development of country with its principles.   8

5. Define thermal insulation. What are the passive techniques of thermal insulation for residential building? Explain with sketches.   2+6

6. Write short notes on any TWO: 2×4=8

   (a) Design consideration for airport design

   (b) Influencing factors for architectural development

   (c) Reconstruction and restoration

PURBANCHAL UNIVERSITY
2023

B. E. (Civil)/Fourth Semester/*Final*

Time: 03:00 hrs.   Full Marks: 80 /Pass Marks: 32

BEG203SH: Probability & Statistics *(New Course)*

Candidates are required to give their answers in their own words as far as practicable.

The figures in the margin indicate full marks. Necessary statistical tables are allowed.

Group A

Answer FOUR questions.   4×(4+6)=40

1(a) Find the median income of the following distribution.   4

Income	0-500	500-1000	1000-1500	1500-2000	2000-2500
No. of workers	12	39	54	42	26

(b) During the 10 weeks of a session, the population marks scored by two candidates A and B taking the computer program course are given below: 6

A	58	59	60	54	65	66	52	75	49	52
B	87	89	78	71	73	84	64	66	56	46

If the consistency of performance is the criterion for awarding a prize. Who should be the awarded by the prize.

2(a) Define regression and write the properties of regression.   4

(b) Regression methods were used to analyze the data from a study investigating the relationship between roadway surface temperature (x) and pavement deflection (y). Summary quantities were: n=20, $\sum y_i$ = 12.75, $\sum y^2_i$ = 8.86, $\sum x_i$ = 1478, $\sum x^2_i$ = 143,215.8 and $\sum x_i y_i$ = 1083.67.

(i) Calculate the least squares estimates of the slope and intercept and graph the regression line.

(ii) Use the equation of the fitted line to predict what pavement deflection would be observed when the surface temperature is 85°F.   6

3(a) If a chance of getting job for two candidates for 2 post is 1/4 and 3/4 respectively find the probability that:

(i) both get the job

(ii) At least one get the job

(b) An island has three species of bird. Species 1 accounts for 45% of the birds, of which 10% have been tagged. Species 2 accounts for 38% of the birds, of which 15% have been tagged. Species 3 accounts for 17% of the birds, of which 50% have been tagged. If a tagged bird is observed, what are the probabilities that it is of species 1, of species 2, and of species 3?   6

4(a) A random variable x has following probability function...   4

x	-2	-1	0	1	2	3
p(x)	0.1	k	0.2	2k	0.3	k

Find mean and variance of X.

(b) IF a random variable x has following probability distribution as: 6

$$f(x) = \begin{cases} k\ e^{-\frac{x}{5}} & for \quad 0 \le x < \infty \\ 0, & otherwise \end{cases}$$

Find,

(i) k   (ii) mean   (iii) variance

5(a) Show that mean and variance of binomial distribution are np and npq. 4

(b) At a checkout counter customers arrive at an average number of 1.5 per minute. Find the probability that: By using suitable probability law.   6

(i) At most four will arrive in any given minute.

(ii) At least 3 will arrive during an interval of 2- minutes.

(iii) At most 5 will arrive during an interval of 6 minute

Group B

Answer FOUR questions.   4×(4+6)=40

6(a) Define standard normal distribution and write down the properties of normal distribution.   4

(b) Scores on a standardized test are approximately normally distributed with a mean of 480 and a standard deviation of 90.   6

(i) What proportion of the scores are above 700?

(ii) What is the 25th percentile of the scores?

(iii) What proportion of the scores are between 420 and 520?

7(a) Define population, sample, parameter and statistics with example. 4

(b) In a sample of 80 ten-penny nails, the average weight was 1.56 g and the standard deviation was 0.1 g.   6

(i) Find the standard error of the sample mean.

(ii) Find a 95% confidence interval for the mean weight of this type of nail.

8(a) Define Hypothesis. Write down the steps of hypothesis testing of difference of proportion.   4

(b) From the following data of two groups: 6

Groups	Mean	s.d.	sample size
A	100	12	90
B	105	15	115

Test whether the difference between population mean is significant or not at 4% level of significant.

9(a) Write the test procedure of paired t-test.   4

(b) Two horses A and B were tested according to time (in seconds) to run a particular track with following data: 6

Horse A	28	30	32	33	33	29	34
Horse B	29	30	30	24	27	29	-

Test whether two horses has same running capacity or not.

10(a) Write down the test procedure of chi-square test of goodness of fit. 4

(b) A sample of 500 workers of a factory according to gender and nature of work is as follows: 6

Nature of work	Gender		Total
	Male	Female	
Technical	200	100	300
Non-technical	50	150	200
Total	250	250	500

Test at 5% level of significance whether there exists any relationship between gender and nature of work?

$\approx$

B.E. (Civil)/Fourth Semester/*Final*

Time: 03:00 hrs.   Full Marks: 80 /Pass Marks: 32

BEG263CI: Engineering Hydrology *(New Course)*

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side.

Answer FIVE questions.   5×16=80

1(a) Describe Hydrological cycle in brief with the neat sketch.   6

(b) The annual rainfall data for a station Z as well as the surrounding 10 stations in a hydrologically homogenous region are as follows. Test the inconsistency of the rainfall data and correct the rainfall of Z if there is any discrepancy. Assume that the rainfall data of the early years are correct.   10

Year	Annual Rainfall of Station Z	Average annual rainfall of the neighboring stations	Year	Annual Rainfall of station Z	Average annual rainfall of the neighboring stations
1950	676	780	1965	1244	1400
1951	578	660	1966	999	1140
1952	95	110	1967	573	650
1953	462	520	1968	596	646
1954	472	540	1969	375	350
1955	699	800	1970	635	590
1956	479	540	1971	497	490
1957	431	490	1972	386	400
1958	493	560	1973	438	390
1959	503	575	1974	568	570
1960	415	480	1975	356	377
1961	531	600	1976	685	653
1962	504	580	1977	825	787
1963	828	950	1978	426	410
1964	679	770	1979	612	588

2(a) What is rain gauge? Explain different types of rain gauges? What are the sources of error in the rainfall measurement?   1+6+1

Contd. ...

(b) A catchment of 30 Km2 area has one recording gauge. The data of mass curve of the rainfall during the storm is given below. The volume of the surface runoff is 1.3 million cubic meter, compute the depth of runoff, phi index and w index.   8

Time (hr)	0	2	4	6	8	10	12	14
Cumulative rainfall (mm)	0	6	17	57	70	81	87	90

3(a) Explain the different methods for estimating the average precipitation over a catchment.   6

(b) Calculate the flood discharge of a certain stream by slope area method using the following data. Upstream flow area = 3522 m², upstream wetted perimeter = 650 m, downstream flow area = 3259 m², downstream wetted perimeter = 621 m. Reach length = 10 Km and Manning's roughness (n)= 0.028 and fall = 0.255m. 10

4(a) Explain the procedure of discharge measurement using the current meter?   6

(b) Following are the co-ordinates of a 6h-unit hydrograph. Derive the ordinates of the flood hydrograph due to two successive rainfalls of 3 hour durations with magnitude of 2 cm and 4 cm if the phi-index of the catchment is 1/6 cm/hr. Assume constant base flow of 20 m³/sec.   10

Time (hr)	0	3	6	9	12	15	18	21	24	27	30	33	36
Discharge (m³/sec)	0	40	100	80	60	40	28	20	14	10	6	2	0

5(a) What are the causes and effects of flood? Write down the structural and non-structural measures to mitigate flood.   3+5

(b) The analysis of the annual flood of a river yielded average and standard deviations as 1200 m³/sec and standard deviation as 650 m³/sec. For what discharge would you design the structure to provide 95 % assurance that the structure would not fail in next 50 years. Use Gumbel's method and assume the sample size to be infinite.   8

6(a) What is the importance of groundwater in Nepalese context? What are the appropriate measures in your opinion to increase the ground water reserve in our watersheds?   3+3

(b) The discharge of a fully penetrating well under steady state in a confined aquifer of 35m thickness is 3000 liters per minute. Values of drawdown of observation wells at 12m and 120m away from the well are 3.0 m and 0.3m are respectively. Find the permeability of the aquifer and the distance from the main well where drawdown is insignificant. Also determine the specific yield of the aquifer. The radius of main well is 0.2m.   10

PURBANCHAL UNIVERSITY
2023

B.E. (Civil)/Fourth Semester/*Final*

Time: 03:00 hrs.   Full Marks: 80/Pass Marks: 32

BEG262CI: Hydraulics *(New Course)*

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side. Assume suitable data if necessary.

Answer FIVE questions.   5×16=80

1(a) Differentiate between pipe flow and open channel flow.

Derive the equation for the shear stress for a laminar flow in circular pipe.   3+5

(b) A laminar flow is taking place in a pipe of diameter 200 mm. The maximum velocity is 1.5 m/s. Find the mean velocity and the radius at which this occurs. Also calculate the velocity at 4 cm from the wall of the pipe.   8

2(a) What is friction factor? Write the Colebrook-white equations for the friction factor for different cases of pipe roughness.   4

(b) A reservoir having its water level at 300m elevation is connected to a point P through a pipe of diameter 22cm and length 150m. At point P, pipe branches into two, 20cm diameter, 300m length and 18cm diameter and 225m length respectively to connect two reservoirs having water levels at elevations 250m and 225m. Find the magnitude and direction of flow in each pipes. Take f=0.016.   8

(c) A siphon of diameter 200mm connects two reservoirs having water level difference of 15m. Total length of the siphon is 600m and it crosses a highest point 5m above the upper reservoir level. If the flow separation takes place at 2.7m of water absolute, find the maximum length of inlet leg of the siphon. Take P_{atm} = 10.3m of water and f=0.016.   4

3(a) Find wetted area, wetted perimeter and hydraulic radius of the circular channel of radius r, depth of flow y and θ is an angle subtended by water surface at the centre of the pipe.   6

(b) A trapezoidal channel with side slopes of 3 horizontal to 2 vertical

has to be designed to convey 10 m3/s at a velocity of 1.5 rn/s so that the amount of concrete lining for the bed and the sides is minimum. Find (i) the wetted perimeter, and (ii) slope of the bed if Manning's coeff = 0.014.

(c) Prove the statement "The error in the calculated discharge in case of rectangular notch is 1.5 times the error made in measurement of head".   4

4(a) Derive governing equation of gradually varied flow.   6

(b) A rectangular channel 3.5m wide conveys discharge of 15m³/s at a depth of 2m. It is proposed to reduce the bed width of the channel at the downstream. Assuming the channel to be smooth, frictionless and horizontal, find the limit bed width at the contracted section that can be adopted without changing upstream flow depth. What will the depth at contracted section if the width is contracted to 2.9m.   4+6

5(a) What is mobile boundary channel? Explain with examples. Write the steps to design mobile boundary channel by maximum permissible velocity method.   3+5

(b) A sluice gate discharges water into a horizontal rectangular channel with a velocity of 8 m/s and the depth of flow is 0.6 m. The width of the channel is 6 m. Determine whether hydraulic jump occurs, and if so, find height of jump, length of jump and the loss of power during the jump.   8

6   Write short notes on: 4×4=16

(a) Equivalent pipe

(b) Importance of physical modeling

(c) Repelled Jump

(d) Surge tank
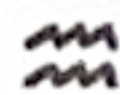
PURBANCHAL UNIVERSITY
2023

B. E. (Civil)/Fourth Semester/*Final*

Time: 01:30 hrs.   Full Marks: 40 /Pass Marks: 16

BEG296MS: Research Methodology *(New Course)*

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks.

Answer FIVE questions.   **5×8=40**

1.   Define research hypothesis. Discuss validity and reliability.

2.   What is the importance of data collection? Differentiate primary and secondary source of data collection.

3.   What do you understand by a Research Design? Briefly explain any three research design frequently used in research in engineering field.

4.   What do you understand by social research in engineering? Define and compare Applied and Fundamental Research.

5.   What do you understand by the term report writing? Briefly explain how to organize report in research.

6.   Write short notes on: 4×2=8

    (a) Objective of research

    (b) Major elements of research proposal

    (c) Median with example

    (d) Sampling in research process

PURBANCHAL UNIVERSITY
2023

B.E. (Civil)/Fourth Semester/*Final*

Time: 03:00 hrs.   Full Marks: 80 /Pass Marks: 32

**BEG265CI: Theory of Structure-I** *(New Course)*

Candidates are required to give their answers in their own words as far as practicable.

All questions carry equal marks. The marks allotted for each sub-question is specified along its side. Assume necessary data appropriately if required.

Answer FIVE questions.   **5×16 = 80**

1. The truss shown consist members of aluminum pipe with the cross-sectional areas indicated and carry a load **P**. If the temperature of members **AC** and **CE** goes up by 20°, also member DE is too short by 20mm during fabrication. Using $E=2\times10^5 N/mm^2$ and $\alpha=12\times10^{-6}/°C$, determine the vertical deflection of the joint C caused by the load, temperature variation and lack of fit.   16
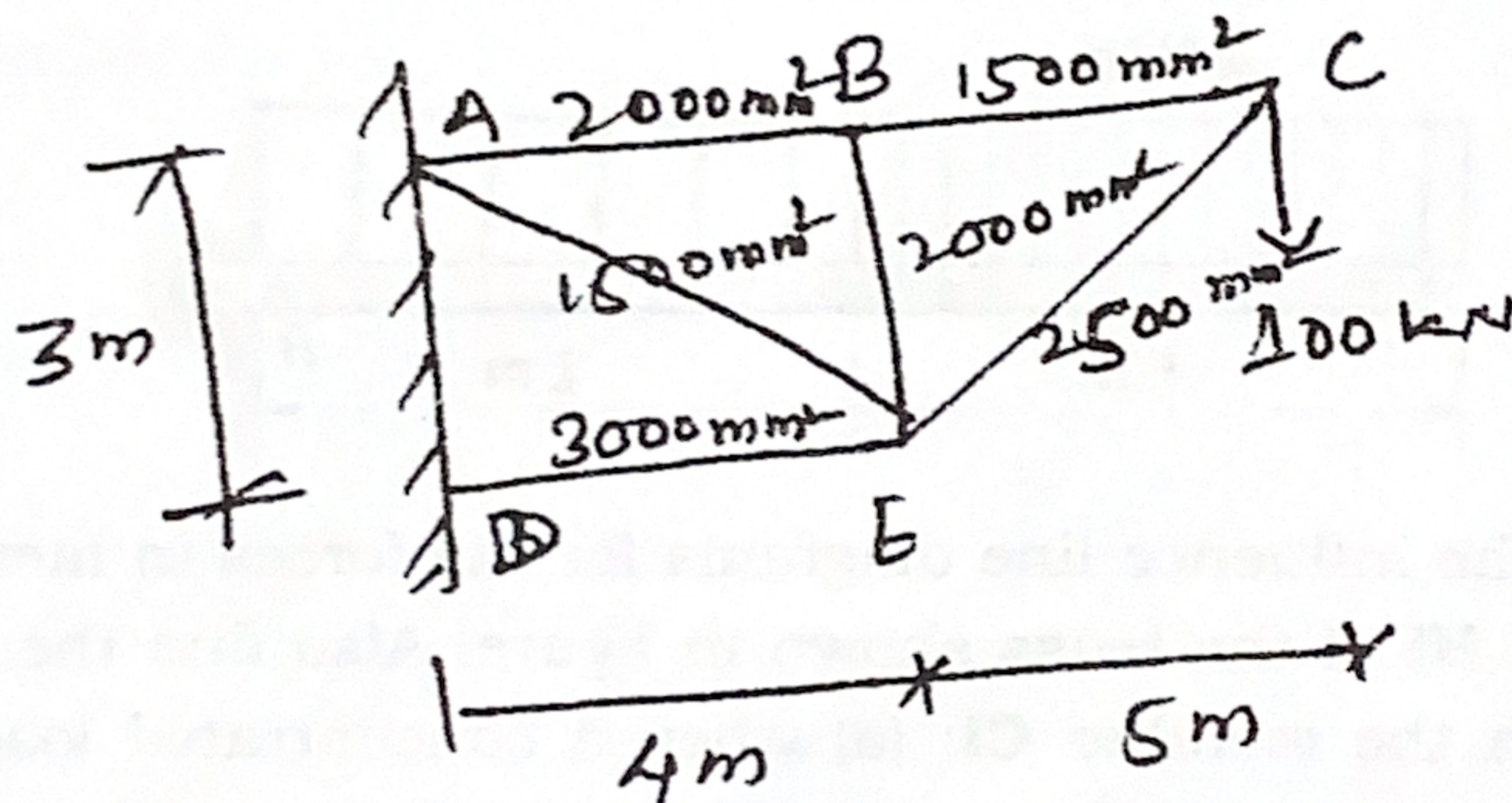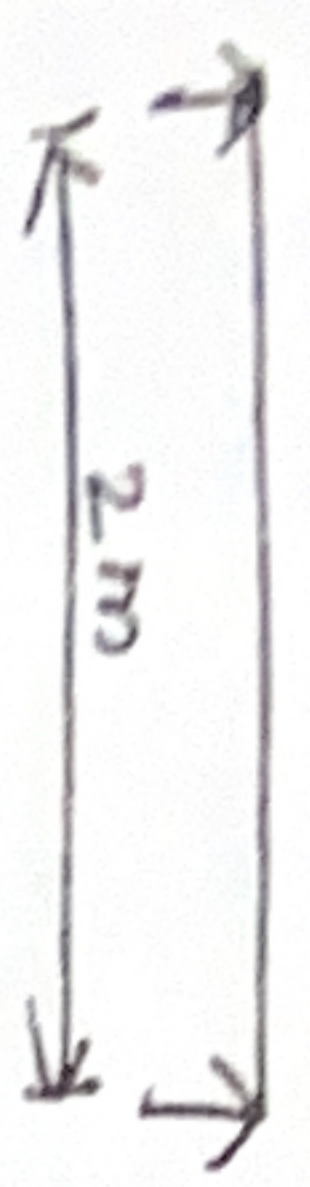

2(a) Calculate the strain energy in the beam shown and determine the deflection under the load. Take EI=25MNm².   8
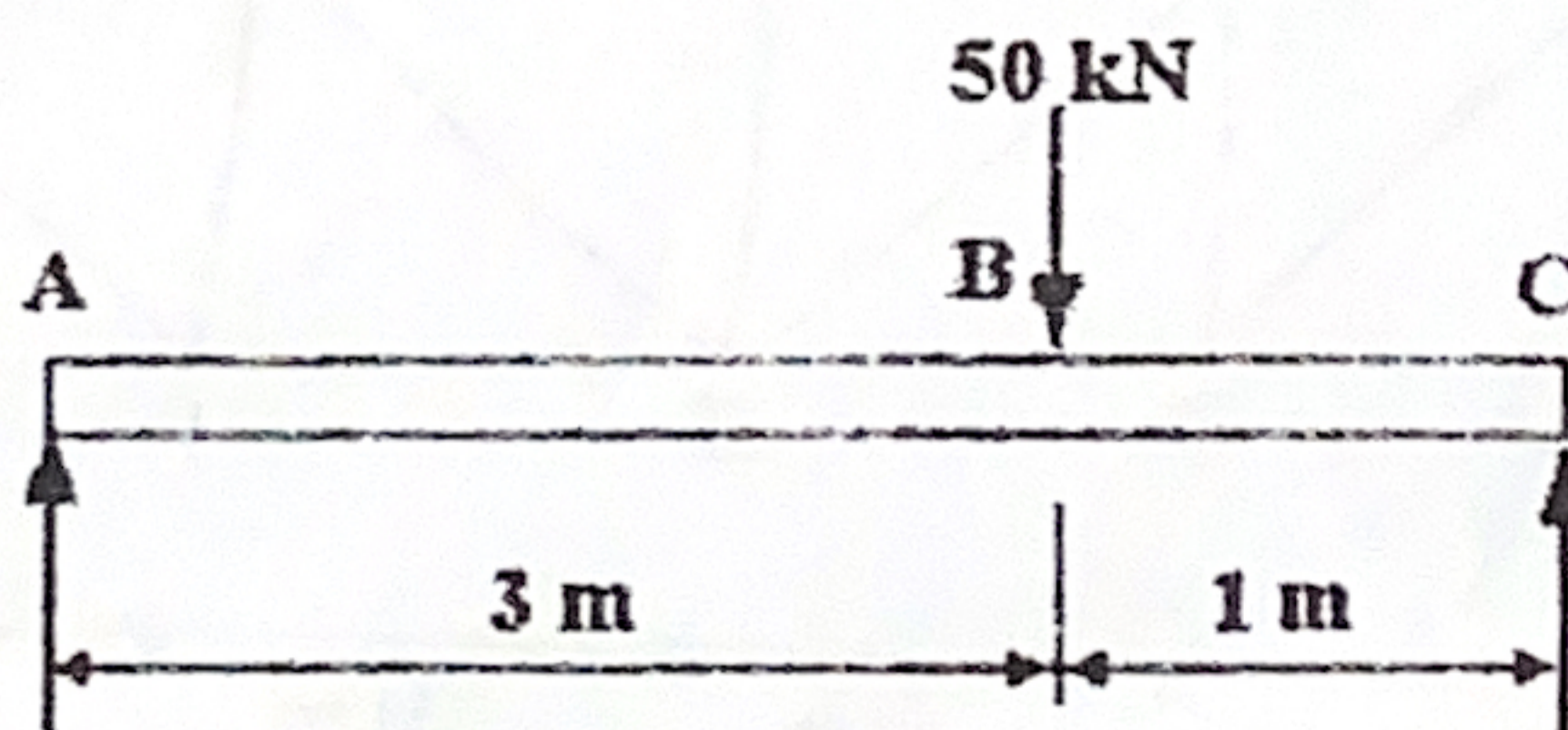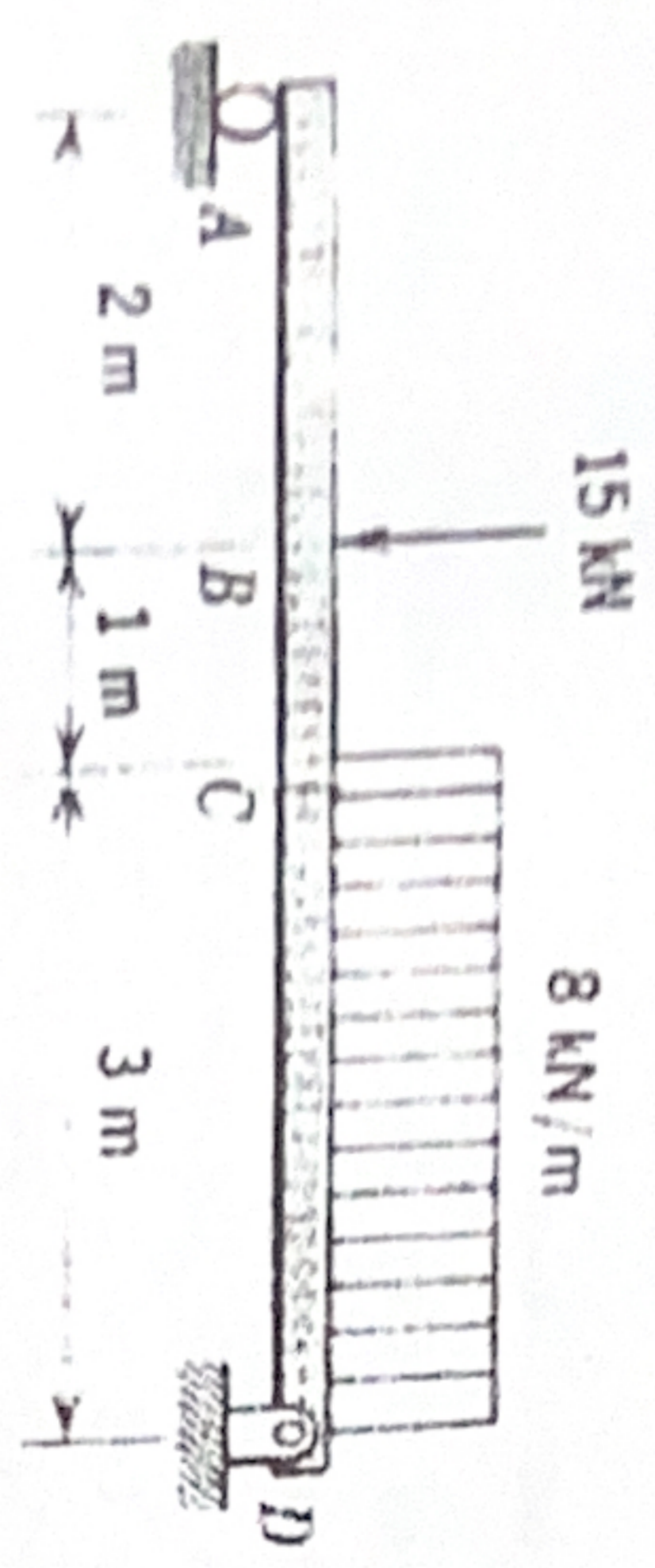
(b) A block of weight W=50KN is dropped from a height h=25mm onto the center of the beam of length L=2m. Determine the maximum value of the deflection and stresses in the beam. 8


2 m

3(a) Using moment area method, compute the slope at A and deflection at C in beam shown. Take El constant throughout the span. 8

15 kN

8 kN/m

A   2 m   B   C
         1 m   3 m   D

(b) Using integration method, determine the deflection of the free end of the cantilever beam shown in terms of w, L, E, and I. 8

w N/m

L m   L m   B
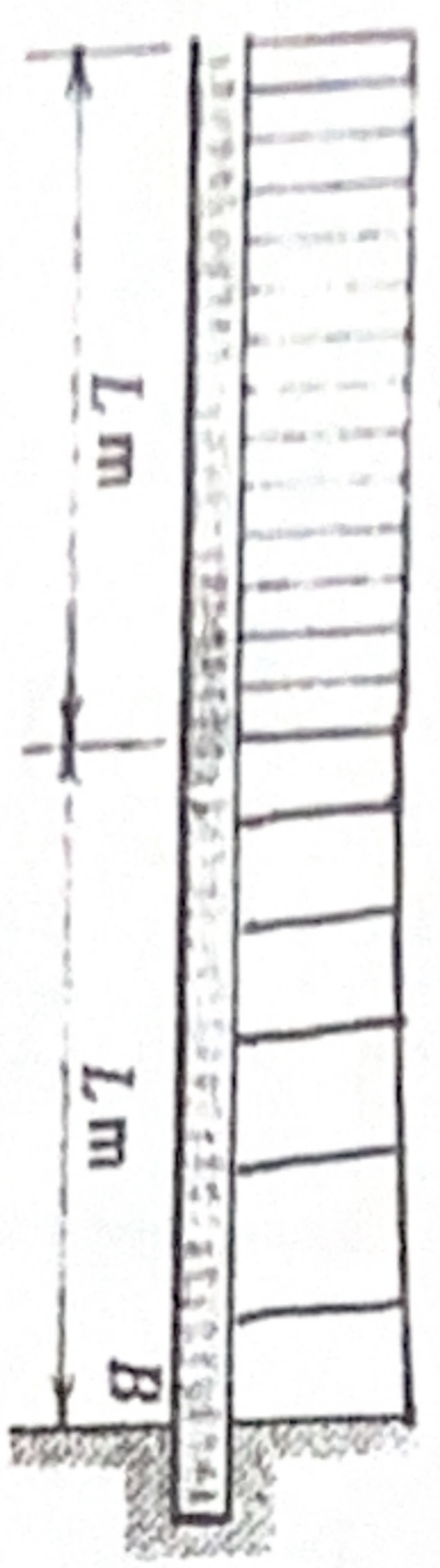
4. Draw the influence line diagrams for the forces in members CD, CI and HI of the truss shown in figure. Also find the maximum force in the member CI; (a) when a concentrated load of 25KN and (b) when 15KN/m UDL of longer than span traverse over the truss. 16
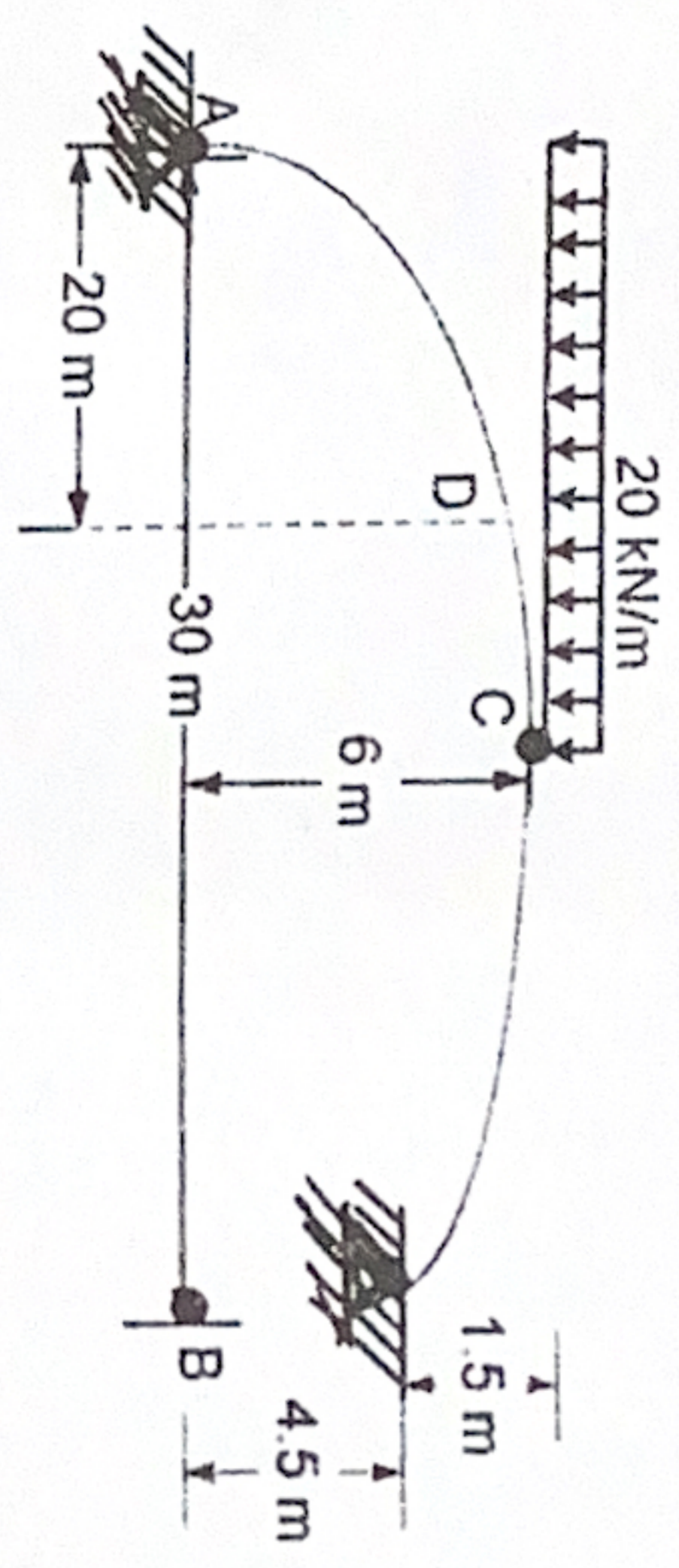

4m

4m   4m   4m   4m
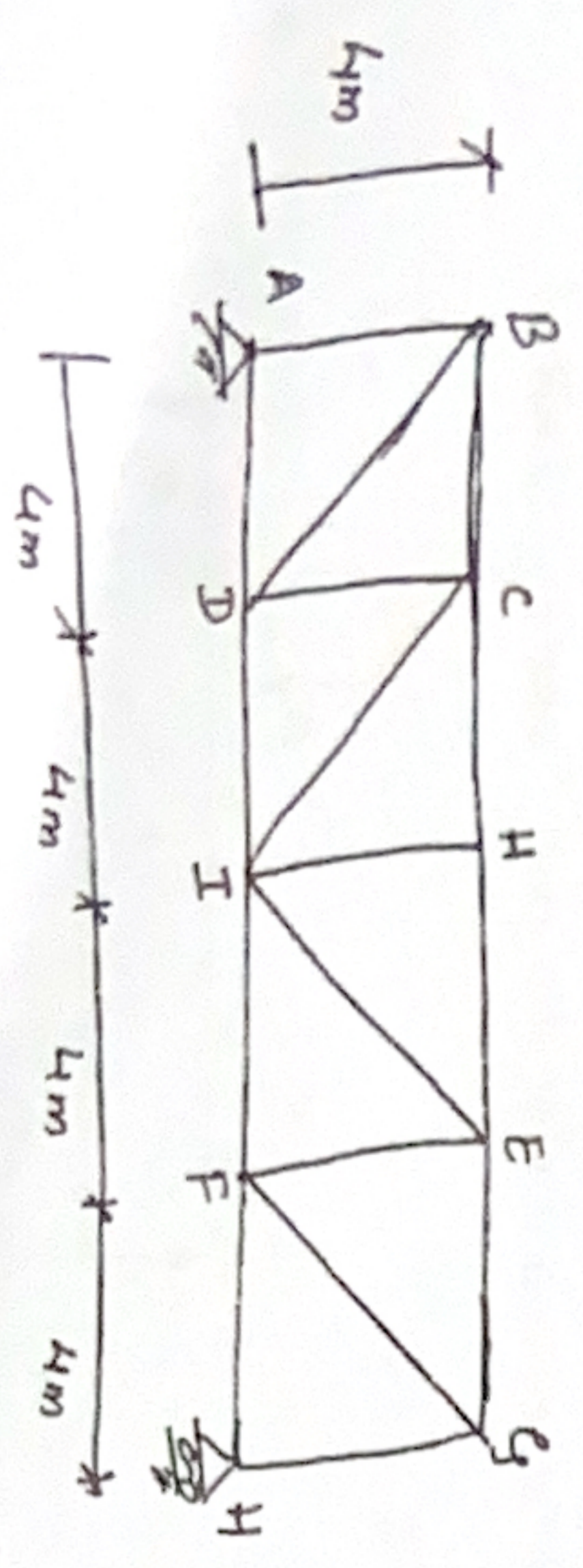
Contd. ...

5(a) Draw ILD for various resultant stress at specified point in simple supported beam. 4

(b) A three hinged parabolic arch 30 m span has abutments at unequal level. The highest point of the arch is at 6 m and 1.5m from the two abutments as shown in figure. Find the horizontal thrust and B.M. at D due to loading shown. 12

20 kN/m

D   C   1.5 m
6 m
20 m   30 m   B   4.5 m

6(a) Define structure. What are the types of structure? 4

(b) A cable of horizontal span 27m is to be used to support eight equal loads of 30KN each at 3m spacing. The central dip of the cable is 2m. Find the length of the cable required and tension in each segment. 12