

ADAMAS UNIVERSITY
END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Tech

Semester: VI

Stream: CE

PAPER TITLE: Design of Steel Structure

PAPER CODE: ECE43102

Maximum Marks: 40

Time duration: 3 Hours

Total No of questions: 08

Total No of Pages: 02

Instruction to the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
 2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
 3. Assumptions made if any, should be stated clearly at the beginning of your answer.
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Answer all the Groups

Group A

Answer all the questions of the following

5 × 1 = 5

1.
 - a) What is the minimum pitch distance to be provided between two 20mm diameter bolts (lying on the same plane) as per IS 800:2007?
 - b) What is the maximum value of effective slenderness ratio for a tension member in which a reversal of direct stress occurs due to loads other than wind and earthquake?
 - c) Find out the design strength due to yielding of gross section of ISMB350 if $f_y = 250\text{Mpa}$.
 - e) What is shape factor?

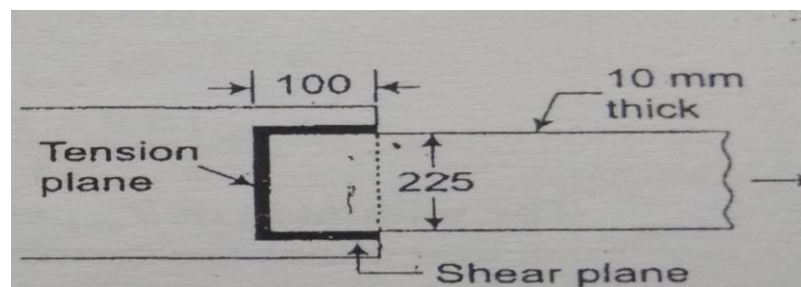
GROUP –B

(Short Answer Type Questions)

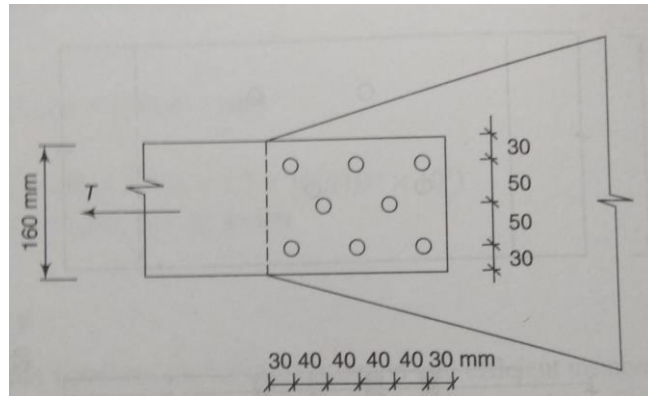
Answer any three of the following

3 × 5 = 15

2.
 - a) What is the optimum depth of a plate girder if the moment is 4275 kN-m and slenderness ratio is 180. Assume $f_y = 250\text{Mpa}$.
 - b) Briefly write down all the steps to design a plate girder.
3. Determine the block shear strength of the welded tension member shown in fig if steel is of grade Fe410.



4. Determine the tensile strength of a plate 160x6mm ($f_y = 250\text{Mpa}$) connected to an 8mm gusset plate using 16mm diameter bolt as shown in fig. below if the yield and ultimate stress of the steel used are 250Mpa and 410Mpa respectively.



5. Determine the design axial strength of the pin ended column section ISMB350. Given that the height of column is 3.0m. Also assume the following: $f_y = 250\text{Mpa}$, $f_u = 410\text{ MPa}$, $E = 2 \times 10^5\text{ N/mm}^2$.

GROUP –C
(Long Answer Type Questions)
 Answer *any two* of the following

2 × 10 = 20

6. Design a pin-ended batten column 9m long to carry a factored load of 1200kN. Use bolted connection to connect batten with column section. (Use two channel section back to back)
7. A column section ISHB450 (92.5kg/m) is subjected to following factored loads: Axial compressive load=500kN, Moment=95 kN/m. Assuming M25 grade of concrete for pedestal and a square base plate, design the thickness and section of base plate along with the design of weld to connect the column with base plate.
8. Find out the plastic moment (using sway mechanism, beam mechanism and combined mechanism) for a portal frame having two columns of height 3m and 6m connected with a beam of length 4m. The beam is subjected to a concentrated load of 40 kN at the middle of span. The 3m column is subjected to horizontal load of 10 kN at rigid joint between beam and column towards 6m height column.

ADAMAS UNIVERSITY
END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Tech

Semester: VI

Stream: CE

PAPER TITLE: Structural Analysis-III

PAPER CODE: ECE43104

Maximum Marks: 40

Time duration: 3 Hours

Total No of questions: 08

Total No of Pages: 03

Instruction to the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
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3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Answer all the Groups

Group A

Answer all the questions of the following

5 × 1 = 5

1. a) What are the basic unknowns in Flexibility matrix method?
b) Define Stiffness coefficient.
c) What is the basic aim of the stiffness method?
d) What is the equilibrium condition used in the Stiffness matrix method?
e) Write a short note on Global stiffness matrix.

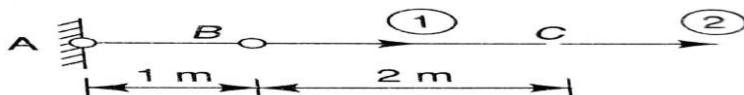
GROUP –B

(Short Answer Type Questions)

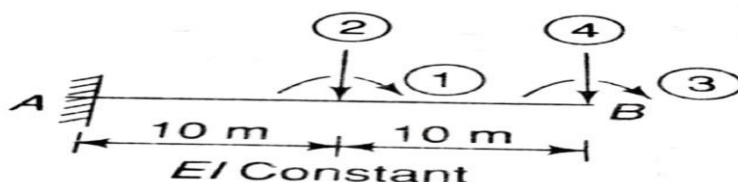
Answer *any three* of the following

3 × 5 = 15

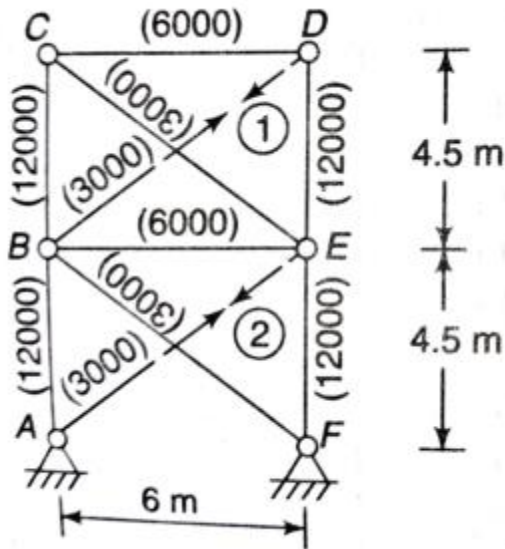
2. Two steel bars AB & BC, each having a cross-sectional area of 20 mm^2 , are connected in series as shown in figure below. Develop the flexibility matrix for the whole structure with reference to coordinates 1 & 2. Take, $E=200 \text{ kN/mm}^2$.



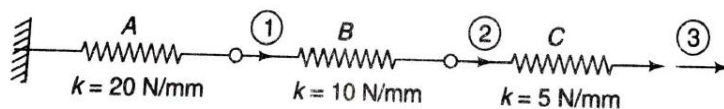
3. Develop the stiffness matrix for beam AB with reference to coordinates as shown in figure below.



4. Develop the flexibility matrix with reference to coordinates 1 and 2 of a pin-jointed plane frame as shown in Figure below. The numbers in parentheses are the cross-sectional area of the members in mm^2 .



5. Three springs A, B, and C are connected in series as shown in figure below. Develop the stiffness matrix for the whole structure.



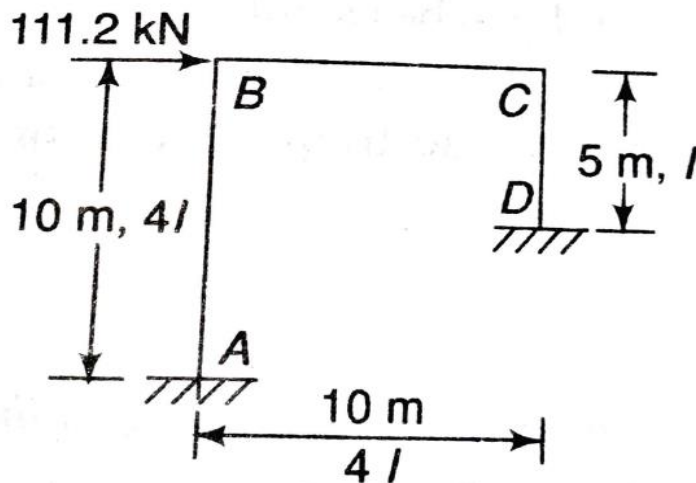
GROUP -C

(Long Answer Type Questions)

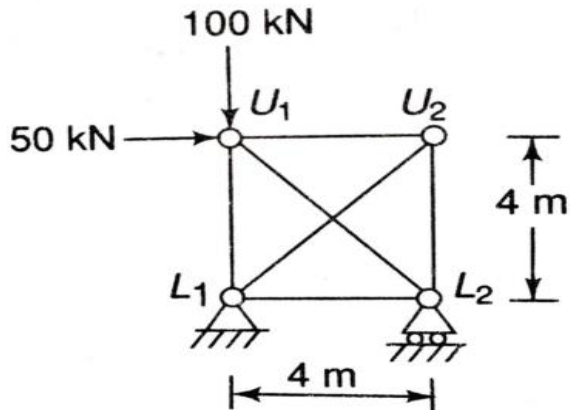
Answer any two of the following

$2 \times 10 = 20$

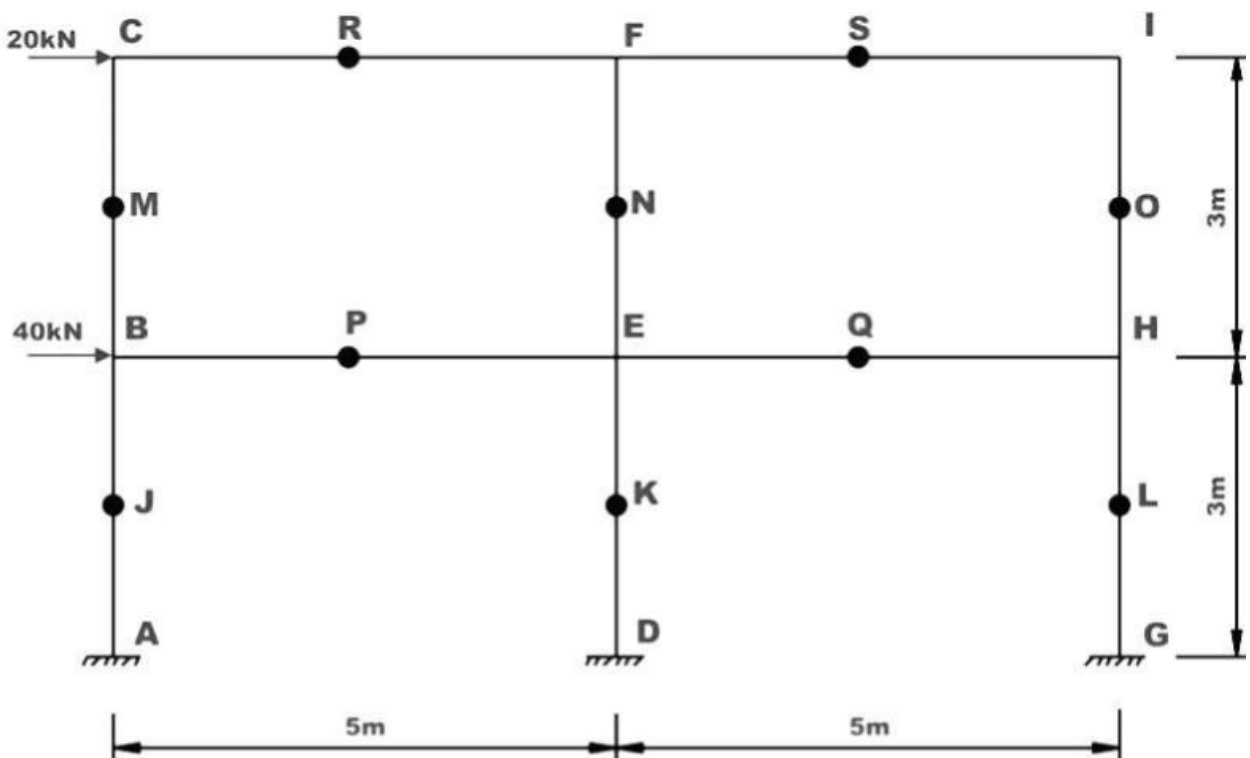
6. Analyse the portal frame as shown in figure below by Flexibility Method if the settlements of support D to the right and downwards in kN-m units are $200/EI$ & $500/EI$ respectively.



7. Analyse the pin-jointed plane frame as shown in figure below by Stiffness Method. The axial stiffness for each member is 40 kN/mm .



8. Analyse the frame shown in Fig. below by Cantilever method and evaluate approximately the column end moments, beam end moments, shears in beam and axial forces in column. Consider, sectional properties of all columns are same.





ADAMAS UNIVERSITY
END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Tech

Semester: VI

Stream: CE

PAPER TITLE: Water Resources Engineering- I

PAPER CODE: ECE43106

Maximum Marks: 40

Time duration: 3 Hours

Total No of questions: 08

Total No of Pages: 02

Instruction to the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
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Answer all the Groups

Group A

Answer all the questions of the following

5 × 1 = 5

1.
 - a) Define Specific retention.
 - b) What is the concept of Transpiration ratio?
 - c) Mention about crop seasons in India.
 - d) What are methods available to determine average or mean precipitation?
 - e) List out the type of evaprimeters used for estimating evaporation.

GROUP –B

(Short Answer Type Questions)

Answer *any three* of the following

3 × 5 = 15

2. Mention and explain shortly about the basic assumptions Unit-hydrograph theory. (5)
3. There are 6 raingauge stations A,B,C,D,E & F in a basin. In 2019 following annual precipitation (R_x) recorded by stations in cm :
 $R_A = 82.6$ cm, $R_B = 102.9$ cm, $R_C = 180.3$ cm and $R_D = 82.6$ cm, $R_E = 98.8$ cm and $R_F = 136.7$ cm.
Find out the standard error and extra raingauges required. (5)
4. Discuss about forms of subsurface water with neat sketches. (5)
5. Explain about different type of ground water flow through a stratified aquifers with different permeabilities in layers with proper sketches. (5)

GROUP –C

(Long Answer Type Questions)

Answer *any two* of the following

2 × 10 = 20

6.
 - a) Analysis of data on maximum one-day rainfall depth at Chennai indicated that a depth of 30cm had a return period of 50 years. Find out the probability of a one-day rainfall depth equal to or greater than 30cm at the city occurring (i) once in 20 successive years, (ii) two times in 15 years and (iii) at least once in 20 years. (5)
 - b) Derive the relationship between discharge in ditch, average depth of water on strip, rate of infiltration, land area to be irrigated and time to irrigate land area for irrigation purpose. (5)
7.
 - a) What is duty, delta and derive relationship between these two factors. (5)

b) The peak of flood hydrograph due to a 3hr duration isolated storm in a basin is $270 \text{ m}^3/\text{s}$. The total depth of rainfall is 5.9 cm. Assuming an average infiltration loss of 0.3 cm/hr and a constant base flow of $20 \text{ m}^3/\text{s}$, estimate the peak of the 3hr unit hydrograph (UH) of this basin. (2.5)

Also find out the base width of the 3hr UH if basin area is 567 km^2 . Assume UH is triangular in shape. (2.5)

8. a) Answer the following :

(i) What is the classification of irrigation water which possesses following characteristics:

Na, Ca and Mg concentration of 22, 3 and 1.5 mili-equivalent/litre respectively, and electrical conductivity is 200 micro-mhos/cm at 25°C ? (3)

(ii) What problems might arise in using this water on fine textured soils and suggest remedies to overcome this problem. (2)

b) A pumping test was made in a medium sand and gravel to a depth of 15 m where a bed of clay was encountered. The normal ground water level was at the surface. Observation holes are located at distances of 3m and 7.5 m from the pump well. At a discharge of 3.6 litres/s from the pumping well, a steady state was attained in about 25 hrs. The drawdown at 3m was 1.65 m and 7.5 m was 0.36 m. Compute the permeability coefficient of soil. (5)



ADAMAS UNIVERSITY

SCHOOL OF ENGINEERING AND TECHNOLOGY

END-SEMESTER EXAMINATION: JULY 2020

Name of the Program: B. Tech

Semester: VI

Stream: CE

PAPER TITLE: Transportation Engineering II

PAPER CODE: ECE 43108

Maximum Marks: 40

Time duration: 3 hours

Total No of questions: 8

Total No of Pages: 02

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
2. All parts of a Question should be answered consecutively. Each Answer should start from a fresh page.
3. Assumptions made if any, should be stated clearly at the beginning of your answer.

Answer all the Groups

Group A

Answer all the questions of the following

5 × 1 = 5

1. a) What do you mean by Cutback Bitumen?
 b) As per IRC 37:2001 what are the values of lane distribution factor for 2 lane single carriageway and 4 lane single carriageway pavement?
 c) What is the necessity of Flash Point and Fire Point test of Bitumen?
 d) What are the functions of joints in a rigid pavement?
 e) What do you mean by Optimum Bitumen Content?

GROUP –B

(Short Answer Type Questions)

Answer *any three* of the following

3 × 5 = 15

2. What do you mean by ESWL? Derive an expression for finding ESWL at a certain depth 'z' from the pavement surface. **(1+4)**
3. Write a short note on 'Penetration Test of Bitumen'.
4. The following data is obtained from the axle load survey conducted for 4 days. Determine the equivalent number of standard axle loads of 80 kN repetitions per year.

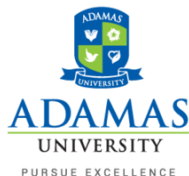
Axle Load in kN	30-40	40-50	50-60	60-70	70-80	80-90
No. of Axles	45	62	67	78	115	106
Axle Load in kN	90-100	100-110	110-120	120-130	130-140	140-150
No. of Axles	110	99	75	89	62	79

5. Explain about (i) Warping Stress and (ii) Frictional Stress developed in rigid pavement. **(2 x 2.5)**

GROUP –C
(Long Answer Type Questions)
Answer *any two* of the following

2 × 10 = 20

6. The width of expansion joint gap is 2.2 cm in a cement concrete pavement. If the laying temperature of slabs is 18°C and the maximum temperature in summer is 44°C, then design the spacing of expansion and contraction joint. Assume, plain cement concrete construction with thermal co-efficient be 10×10^{-6} per °C, unit weight of concrete is equal to 2400 kg/m³, allowable stress in tension during initial curing period = 0.8 kg/cm² and co-efficient of friction at the interface = 1.4.
7. Calculate the stresses at interior, edge and corner regions of cement concrete pavement using Westergarad's stress equations. Use the following data:
- Wheel load P = 5100 kg
 - Modulus of elasticity of cement concrete, E = 3×10^5 kg/cm²
 - Thickness of pavement, h = 20 cm
 - Poisson's ratio, $\mu = 0.15$
 - Modulus of sub-grade reaction, K = 8 kg/cm²
 - Radius of contact area, a = 15 cm
8. Write a short note on the following topics (*any two*). **(2 x5)**
- (a) Expansion joints and its components.
- (b) Aggregate Impact Value Test.
- (c) Contraction Joint and its function.



ADAMAS UNIVERSITY, KOLKATA
School of Engineering and Technology
End Semester Examination (July 2020)

Name of the Program: B. Tech.
Stream: CE
Paper Title: Engineering Geology
Maximum Marks: 40
Total No of questions: 10

Semester: VI
Paper Code: ECE43110
Time duration: 3 hrs
Total No of Pages: 02

Instruction for the Candidate:

1. At top sheet, clearly mention Name, Univ. Roll No., Enrolment No., Paper Name & Code, Date of Exam.
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-

Answer all the Groups

GROUP- A

Answer all the questions of the following

5 x 1= 5

1. i) Name the type of roofs gives better resistance against shocks.
ii) What should be the type of foundation for concrete and masonry buildings?
iii) Name the rock / mineral where foliated structure can be seen.
iv) Structures built on which land have to withstand greater risk during earthquakes?
v) Which sedimentary rock is told to be the best kind of formation for ground water?

GROUP- B

(Short Answer Type Questions)

Answer *any Three* of the following

3 x 5 = 15

2. What is the silica tetrahedron structural difference between pyroxene and amphibole? In which silicates, olivine family belong? What is its structure? What are the two end-members of the plagioclase series?
 $1+1+1+2 = 5$
3. Write short notes (**any Two**) from the followings (draw neat sketch wherever required)

- a) Arch dam b) Drag fold c) Porphyritic texture d) Thermal Metamorphism e) Translational and Rotational faults f) Earth dam

$$2\frac{1}{2} + 2\frac{1}{2} = 5$$

4. What four processes must take place to transform rocks into sediment? What are the differences between Magma and Lava? $2\frac{1}{2} + 2\frac{1}{2} = 5$

5. Write short notes (**any Two**) from the followings (draw neat sketch wherever required)

- a) Anticlinorium Fold b) Types of Stream c) Step Fault d) Buttress dam
e) Types of Drainage System. $2\frac{1}{2} + 2\frac{1}{2} = 5$

6. Below in the left column of the following rocks in the row changes due to metamorphism. Try to match correctly the exact rock transformation after metamorphism in the right column. 5

	Igneous/Sedimentary Rocks		Metamorphic rocks
a)	Granite		Granitic Gneiss
b)	Peridotite (Ultrabasic)		Gneiss
c)	Gabbro / Dunite		Hornblende Schist
d)	Conglomerate		Graphite
e)	Coal		Serpentine / Talc Schist

PART- C

(Long Answer Type Questions)

Answer **any Two** of the following

2 x 10 = 20

7. How is an earth dam different from a concrete dam? Justify the ideal site for location of earth dams. Why is leakage under dam undesirable? How are the leaky foundations treated while constructing a dam? $2+4+2+2=10$
8. What are the different purposes for which tunnel are made? What are the different tunnels? On the basis of geological background, discuss the suitability and unsuitability of common igneous, sedimentary and metamorphic rocks for tunnelling. $3+2+5=10$
9. Describe the seven different case studies with neat sketches in connection with the geological structures for the importance of construction of a dam from the civil engineering point of view. 10
10. Why DC resistivity method is so important for any kind of exploration? Classify this method. State the difference between Slumberger Array and Wenner Array and draw with neat sketch. What are the advantage & disadvantage of these two methods? $3+4+3=10$

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