B020411(020)

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

(AICTE Scheme)

(Civil Engg. Branch)

STRUCTURAL ANALYSIS-I

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

Note : All questions are compulsory with internal choices among (b), (c) and (d). Attempt 20 marks from each unit.

Unit-I

1. (a) Explain kinematic indeterminacy for rigid jointed and pin jointed frames.   4

(b) Find out external, static and kinematic indeterminacy of the given frames.   8

Fig. 1

Fig. 2

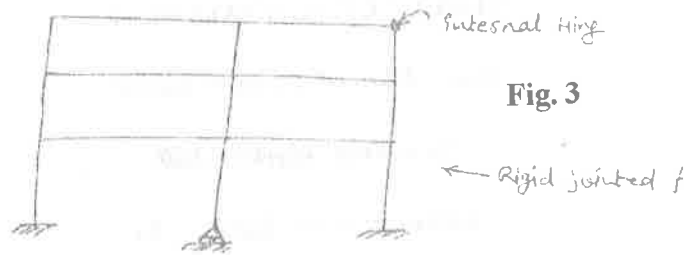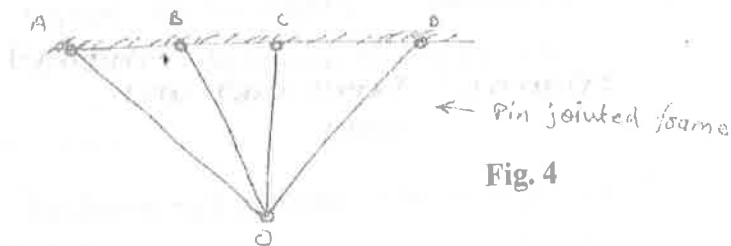(c) Find static and kinematic indeterminacy of the given frames :   8

Internal Hing

Fig. 3

← Rigid jointed f

← Pin jointed frame

Fig. 4

(d) Find the forces in the truss given below using method of tension coefficient.   8
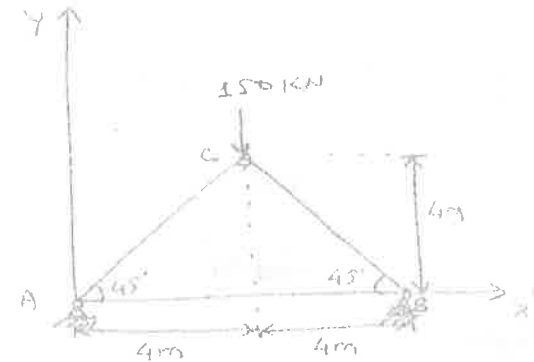

Fig. 5

Unit-II

2. (a) Write the basics of conjugate beam method.   4

(b) Determine the slopes at A and B and the deflection at C and D in the beam shown in figure. EI = Constant.   16

Fig. 6

[4]

(c) Deterine the slope at A and the deflection at C in the beam shown in figure. EI = Constant.　　16
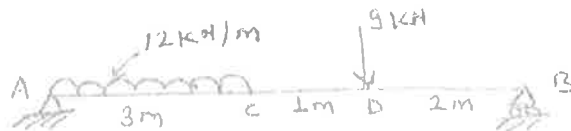

12kN/m　　9kN

A　　3m　c　1m　D　2m　B

Fig. 7

Unit-III

3. (a) Explain :　　4

　　(i) Castigliano's first theorem

　　(ii) Maxwell's reciprocal theorem

　　(iii) Strain energy

　　(iv) Betti's theorem

(b) Determine the deflection and rotation at the free end of the cantilever beam as shown in figure. Use unit load method. Given $E = 2 \times 10^5$ N/mm^2 and $I = 12 \times 10^6$ mm^4.　　16

[5]

10kN　　10kN

A　　B　　C

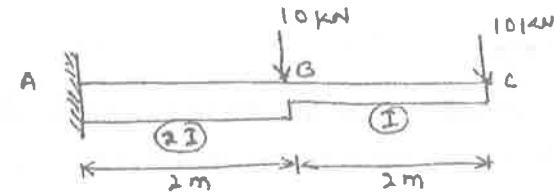(2I)　　(I)

2m　　2m

Fig. 8

(c) Using Castiglianco's first theorem. Determine the deflection and rotation of the overhanging end A of the beam loaded as shown in fig.9.　　16

M

A　　B　　C

L/3　　L

Fig. 9

Unit-IV

4. (a) What is an influence line diagram, and write its uses?　4

(b) The following arrangement of axle loads is carried by a single bridge girder across a clear span of 30 m.

Axle load   5   5   10   10   10

Spacings   2·5   2·5   2·5   2·5

Draw the influence lines for shearing force and bending moment at a point 10 m from the left hand support and determine the maximum bending moment and maximum shear force at this point. The 5 kN load leads and the system may pass over the bridge from either side.   16

(c) Draw the influence line diagram for the forces in the members U_3L_4, U_3U_4 and U_3L_3 of the pin jointed frame shown in the figure.   16
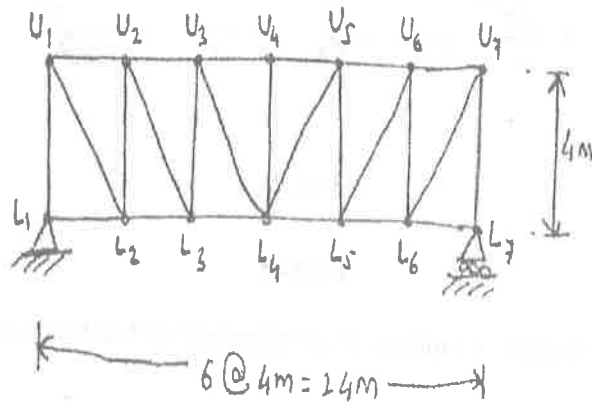

Fig. 10

Unit-V

5. (a) What is a stiffening girder and why is it used?   4

(b) A three hinged parabolic arch of span 40 m and rise 8 m carries a uniformly distributed load of 30 kN/m over the left half of the span. The hinges are provided at the supports and at centre of arch. Calculate reaction at support. Also calculate the bending moment, radial shear and normal thrust at a distance 10 m from the left support.   16

(c) A symmetrical three hinged circular arch has a span of 16 m and central rise to central hinge of 4·0 m. It carries a vertical load of 16 kN at 4·0 m from left end. Find :

(i)   Magnitude of thrust at springing

(ii)   Reactions at support

(iii)   Bending moment at 6·0 from left hand support.   16
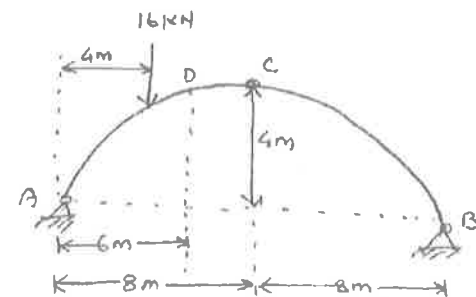
Fig. 11

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

(AICTE Scheme)

(Civil Engg. Branch)

HYDRAULIC ENGINEERING

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. Attempt any **two** parts from (b), (c) and (d) which carry 8 marks each.*

Unit-I

1. (a) Define Hydro-dynamically Smooth and Rough Boundaries?   4

(b) Derive velocity distribution formula for Turbulent flow in Smooth Pipes. 8

(c) A main pipe divides into two parallel pipes which again forms one pipe. The length and diameter for the first parallel pipe are 2000 and 1 m respectively, while the length and diameter of 2nd parallel pipe are 2000 m and 0·8 m. Find the rate of flow in each parallel pipe, if total flow in the main is 3·0 m^3/s. The coefficient of friction for each parallel pipe is same and equal to 0·005. 8

(d) Determine the distance from the pipe wall at which the local velocity is equal of the average velocity for turbulent flow in pipes. 8

Unit-II

2. (a) Define Turbulent Boundary Layer. 4

(b) Derive equation for Displacement Thickness δ^*. 8

(c) Find the displacement thickness, the momentum thickness and energy thickness for the velocity distribution in the boundary layer given by : 8

$$\frac{u}{U} = 2\left(\frac{u}{\delta}\right) - \left(\frac{u}{\delta}\right)^2$$

(d) For the velocity profile given in above question, find the thickness of boundary layer at the end of the plate and the drag force on one side of a plate 1 m long and 0·8 m wide when placed in water flowing with a velocity of 150 mm per second. Calculate the valve of coefficient of drag also. Take μ for water = 0·01 poise. 8

Unit-III

3. (a) Define Back Water and Afflux. 4

(b) Derive equation of Gradually Varied flow. 8

(c) Define critical flow and their types and what are the condition for maximum discharge for given value of

$$E = h + \frac{v^2}{2 g}$$

8

(d) A sluice gate discharges water into a horizontal rectangular channel with a velocity of 6 m/s and depth of flow is 0·4 m. The width of the channel is 8 m. Determine whether a hydraulic jump will occur,

and if so, find its height and loss of energy per kg of water. Also determine the power lost in the hydraulic jump. 8

Unit-IV

4. (a) Write dimensions of the quantities of angular velocity, kinematic viscosity, specific weight and force. 4

(b) State Buckingham's π theorems and the Efficiency of torque T of a disc of diameter D rotating at a speed N in a fluid of viscosity u and ρ density in a turbulent flow is given by

$$T = D^2 N^2 \rho\phi \frac{\mu}{D^2 N\rho}^*$$

8

Prove this by the method of Dimensions.

(c) Define model analysis and different dimensionless numbers in brief. 8

(d) Water is flowing through a pipe of diameter 30 cm at a velocity of 4 m/s. Find the velocity of oil flowing in another pipe of diameter 10 cm, if the condition of dynamic similarity is satisfied between the two pipes.

The viscosity of water and oil is given as 0·01 poise and 0·025 poise.

The sp. gr. of oil = 0·8 8

Unit-V

5. (a) Define hydraulic and mechanical efficiency of turbine. 4

(b) A Kalpan turbine runner is to be designed to develop 7357 kW shaft power. The net available. head is 5·50 m. Assume that the speed ratio is 2·09 and flow ratio is 0·68, and the overall efficiency as 60%. The diameter of the boss is 1/3rd of diameter of the runner. Find the diameter of the runner, its speed and its specific speed. 8

(c) What is a draft tube? Explain in detail. Explain the theory of draft tube? Also give the expression for efficiency of draft tube. 8

(d) A centrifugal pump having outer diameter equal to two times the inner diameter and running at 1000 r. p. m. work against a total head of 40 m. The velocity of flow through the impeller is constant and equal to 2·5 m/s. The vanes are set back at an angle of 40° at outlet. If the outer diameter of the

impleller is 500 mm and width at outlet is 50 mm, determine :

(i) Vane angle at inlet

(ii) Work done by impeller on water per second and

(iii) Manometric efficiency   8

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

(Scheme : AICTE)

(Civil Engg. Branch)

SURVEYING and GEOMATICS

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

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

Unit-I

1. (a) What is purpose of Triangulation Survey?   4

    (b) How intervisibility and height of stations will affect the selection of station.   8

(c) From an eccentric station S, 12·25 m to the west of the main station B, the following angles were measured. 8

$\angle BSC = 76°25'32''$; $\angle CSA = 54°32'20''$

The stations S and C are to the opposite sides of the line AB. Calculate the correct angle ABC if the lengths AB and BC are 5286·5 and 4932·3 m respectively.

(d) What is meant by extension of a base line? Explain with neat sketch, how you would extend a given base line in the field. 8

Unit-II

2. (a) What do you mean by Law of accidental error? 4

(b) Describe on detail about law of weights. 8

(c) How will you determine the most probable values? 8

(d) Adjust the angle of the triangle ABC which has been reduced for spherical express by the method of correlates. 8

$\angle A = 87°35'11'' \cdot 1$ wt. 2

$\angle B = 43°15'17'' \cdot 0$ wt. 1

$\angle C = 49°09'34'' \cdot 0$ wt. 3

Unit-III

3. (a) What are the uses of tacheometry? 4

(b) State the procedure of determining the constant of tachometer. 8

(c) Explain the following : 8

(i) Movable hair method

(ii) Subtense theodolite

(d) Two points A and B are on opposite sides of a summit. The tacheometer was set up at P on top of the summit, and the following readings were taken. 8

Inst. station	Height of inst.	Staff stations	vertical angle	Hair Readings	Remark
P	1.500	A	−10°0'	1.150, 2.050, 2.950	RL of P =
P	1.500	B	−12°0'	0.855, 1.605, 2.355	450.500 m

The tacheometer is fitted with an anallatic lens, the multiplying constant beting 100. The staff was held normal to the line of sight.

Find :

(a) The distance between A and B, and

(b) The gradients of line PA and PB.

Unit-IV

4. (a) What do you mean by datum scale and average scale?   4

(b) Drive the scale of tilted photograph with neat sketch. 8

(c) Derive focal length of a camera lens.   8

(d) What are the various functions of GIS.   8

Unit-V

5. (a) Write the importance of hydrographic surveying.   4

(b) Explain the method of reduction and plotting of soundings.   8

(c) Explain the location of sounding by Range and two angles from shore.   8

(d) Describe any two graphical methods of plotting the sounding position.   8

B020414(020)

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

(AICTE Scheme)

(Civil Engineering Branch)

BUILDING CONSTRUCTION

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

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

Unit-I

1. (a) Define foundation. Why foundation is required in structure. Justify it.   4

(b) What is strap footing? Explain with the help of neat sketch. 8

(c) Write short notes on expansive and non-expansive soil. 8

(d) What are the causes of failure of foundation and its remedial measures. 8

Unit-II

2. (a) Define the term masonry. Name various types of masonry. 4

(b) Write a short note on Brick masonry. Give reasons why brick masonry is preferred over stone masonry. 8

(c) Give a brief discription on slenderness ratio and basic compressive stress. 8

(d) Write short notes on location of doors and windows. 8

Unit-III

3. (a) What is the purpose of providing floors? What are its various components? 4

(b) What are the factors that affect the choice of the flooring materials? Explain in details. 8

(c) Discuss about pitched, flat and curved roof. Name the technical terms used in sloping roof. 8

(d) What do you understand by the term formwork? What are the requirements of a good form work. 8

Unit-IV

4. (a) Name the causes and effect of dampneoss. 4

(b) Discuss about the materials used in Damp proofing. Also explain the important function of the materials. 8

(c) Explain the various defects occurs in plastering work. 8

(d) What are the construction joints? Give a detail note on expansion and contraction joints. 8

Unit-V

5. (a) Define Acoustics. 4

(b) Explain in brief general acoustics defects and suggests the remedial measures. 8

(c) Discuss about the materials used for sound proof
   construction.   8

(d) Give a detailed note on fire safety requirements for
   buildings.   8

B020415(020)

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

A)cɔ E (New Course)

(Civil Engineering Branch)

ENGINEERING GEOLOGY

Paper : (BT3020)

Time Allowed : Three hours

Maximum Marks : 100

Minimum Pass Marks : 35

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

Unit-I

1. (a) The ozone layer is located in :

    (i) the troposphere

    (ii) the stratosphere

(iii) the ionosphere

(iv) the exosphere

(b) Explain the constitution and properties of Mantle and core of earth as explicitly as possible.

(c) Distinguish between the following :

(i) Colour and streak of minerals

(ii) Isomerism and polymorphism

(iii) Ore forming minerals with examples

(d) Describe role of geological investigations in engineering practice.

Unit-II

2. (a) Define Moho's scale of hardness.

(b) Explain the difference giving examples :

(i) Colour and Lustre

(ii) Uniaxial and Biaxial Minerals

(c) Write the physical (megascopic) properties of silica, graphite, asbestos and feldspar.

(d) What are the uses of hematite, iron pyrites, magnetite, chaclopyrite in civil works? Explain each of them.

Unit-III

3. (a) Where are pegmatite deposits found?

(b) What causes ripple marks in sandstone? Explain in detail.

(c) Write petrological notes on :

(i) Basalt

(ii) Dolerite

(iii) Syenite

(iv) Trachyte

(d) What is shell and coralline limestones? Discuss them with examples and their uses.

Unit-IV

4. (a) Define engineering geology and importance in civil engineering.

(b) Describe the various types of faults occur in rocks with neat sketch.

(c) Define fold. And give classification of fold.

(d) Write short notes on :

(i) Angular unconformity and disconformity

(ii) Dip and Strike

(iii) Types of joints rock

Unit-V

5. (a) What are the effects of soil creep?

   (b) Describe the causes of landslide and suggest the preventive measure of it.

   (c) Explain geological hazards and its mitigation.

   (d) Give a brief account of various geological consideration in design of constructed facilities and infrastructure.