5TH Semester Examination –2021-22

Subject	: Structural Analysis II	Roll No	: ....
Course	: B.Tech (Civil)		
Full Marks	: 70	Time	: 3 Hours.

Instructions to the Candidates:
- Read the question paper very carefully.
- Candidates are required to give their answers in their own words as far as practicable.
- Question Paper is divided into Three Parts –A, B & C.
- Part-A is containing 12 multiple choice questions.
- Part- B containing SIX questions out of which FOUR questions are to be answered.
- Part C containing FOUR questions out of which TWO questions are to be answered.
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PART A

MULTIPLE CHOICE QUESTIONS (12x1=12)

1. In the slope deflection equations, the deformations are considered to be caused by_____?

   i) bending moment ii) shear force iii) axial force

   The correct answer is
   a. Only (i)   b. (i)and(ii)   c. (ii) and (iii)   b. d. (i), (ii) and (iii)

2. Beams which is fixed at one end and free in other end are known as
   a. Simply supported beam   b. Fixed beam   c. Overhanging beam d. Cantilever beam

3. A beam which is extending beyond the support is called as
   a. Simply supported beam   c .Fixed beam
   b. Overhanging beam   d. Cantilever beam

4. The beam which is encastered at both end is known as
   a. Simply supported beam   b. Fixed beam c. Overhanging beam   d. Cantilever beam

5. A cantilever beam is one which have
   a. Fixed at both end   b. Free at one end and other end is fixed
   c. Support at its end   d. Supported one or more than two support

6. A concentrated load is one which
   a. act as a point on a beam
   b. spread non uniformly over the whole length of the beam
   c. spread uniformly over the whole length of a beam
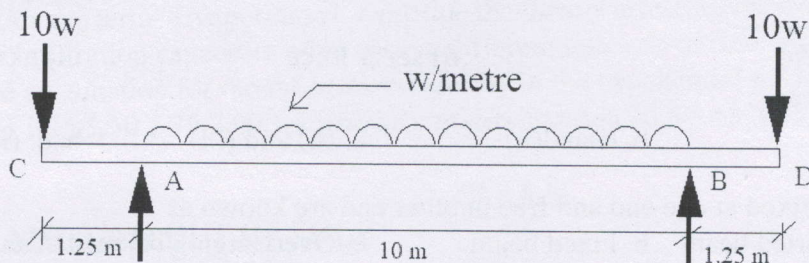   d. none of the following

7. The bending moment on a section is maximum where the shear force is
   a. Minimum   b. Maximum   c. Changing sign   d. Zero

8. If the load at on cantilever beam is increased the failure will occur
   a. At the free end   b. At the fixed end
   c. In the middle of the beam   d. At a distance 2/3 from free end

9. When the simply supported beam is loaded at center the bending moment diagram is
   a. A right angled triangle   c. An isosceles triangle
   b. An equilateral triangle   d, A rectangle

10. The point of contra flexure occur in which bean
    a. Cantilever beams   c. Imply supported beam
    b. Overhanging beams   d. Fixed beam

11. One of the following is the statically determinate beams
    a. Cantilever beams   c. Overhanging beams
    b. Simply supported beams   d. All of the above

12. 12. Which of the following is the statically indeterminate beams
    a. Fixed beam   c. Continuous beams
    b. Both   d. None of the above

PART B

**ANSWER ANY FOUR OUT OF SIX**   (4x7=28)

1. A simply supported beam with over-hanging ends carries transverse loads as shown in fig. below. Draw the shear force and bending moment diagrams.

2. Explain the sign conventions of the Slope Deflection Method with the help of diagrams.

3. What are the steps for Slope Deflection Method analysis? State the formulae for final moments.

4. Calculate the Fixed end moments of the following beam:
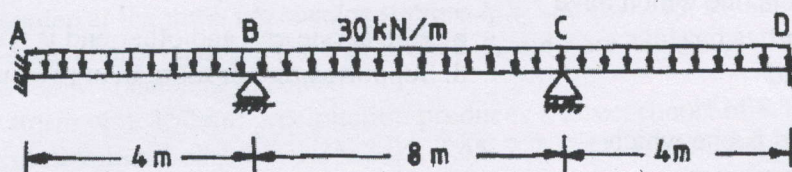
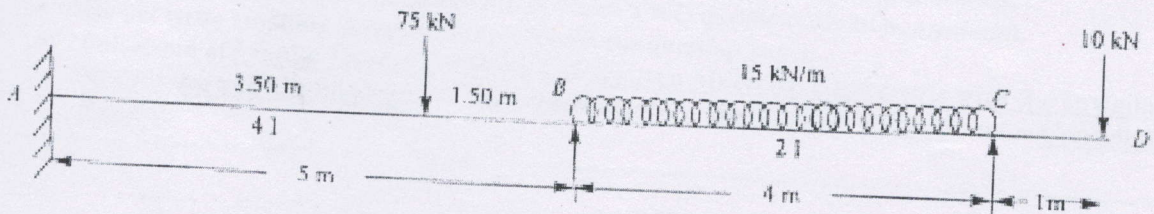5. Calculate the FEM for the various supports of the following beam:

A   10 KN/M   B   50 KN   C

4m   2m   3m
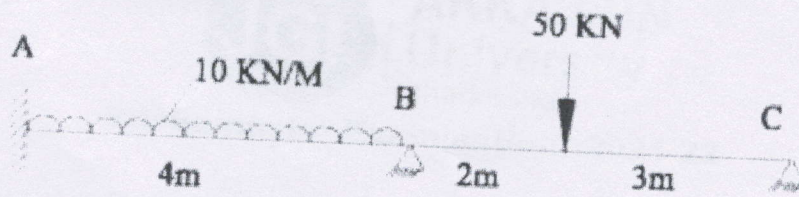
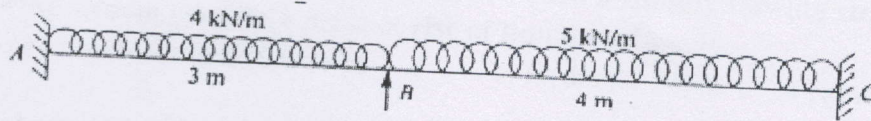6. Write the steps to be followed for the analysis of a beam using Stiffness Matrix Method.

PART C

ANSWER ANY TWO OUT OF FOUR

(2 x15=30)

1. Analyze the continuous beam and draw the S.F.D. and B.M.D. using Moment Distribution Method.

75 kN   15 kN/m   10 kN

A   3.50 m   1.50 m   B   C   D

4 I   2 I

5 m   4 m   1m

2. Analyze the continuous beam and draw the S.F.D. and B.M.D. using Slope Deflection Method.

4 kN/m   5 kN/m

A   3 m   B   4 m   C

3. Analyze the continuous beam and draw the S.F.D. and B.M.D. using Moment Distribution Method.

20 kN/m   12 kN/m

A   B   C

4 m   6 m
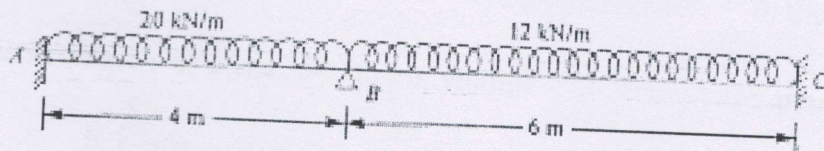
4. Analyze the beam shown in the figure below by Stiffness Matrix Method.

24 kN   12 kN

A   B   C

5m   5m   5m   5m

7+5
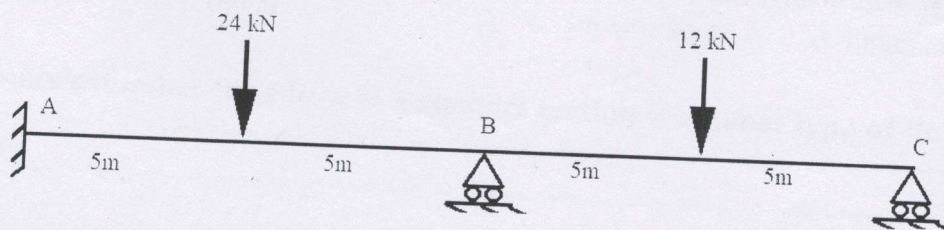
JGi ARKAJAIN University
Jharkhand

5th Semester Examination –2021-22

Subject:	Hydraulics Engineering	Roll No	: ....
Course :	B.Tech Civil		
Full Marks:	70	Time	: 3 Hours.

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PART A

MULTIPLE CHOICE QUESTIONS   (12x1=12)

1. The phenomenon occurring in an open channel when a rapidly flowing stream abruptly changes to slowly flowing stream causing a distinct rise of liquid surface, is

a. Uniform flow   b. Critical discharge   c. Hydraulic jump   d. None of the above

2. The channel whose boundary is not deformable is known as

a. Rigid channel   b. Prismatic channel   c. Mobile channel   d. Boundary channel

3. The flow characteristics of a channel do not change with time at any point. What type of flow is it?

a. Steady flow   b. Uniform flow   c. Laminar flow   d. Turbulent flow

4. The Froude's number for a flow in a channel section is 1. What type of flow is it?

a. Sub Critical   b. Critical   c. Super critical   d. Laminar

5. The Froude's number for a flow in a channel section is 1. What type of flow is it?

(a)	Sub Critical
(b)	Critical
(c)	Super critical
(d)	Laminar

6. Which geometric parameter determines the efficiency of the channel?

a. Hydraulic depth   b. Hydraulic radius   c. Section factor   d. Normal depth

7. The flow characteristics of a channel does not change with time at any point. What type of flow is it?

a. Steady flow   b. Uniform flow   c. Laminar flow   d. Turbulent flow

8. The Reynolds number for a flow in a channel is 1000. What type of flow is it?

a. Laminar   b. Turbulent   c. Transition   d. Steady

9. The ratio of inertia force and gravitational force is called as _____

a. Reynolds number   b. Stokes number   c. Froude's number   d. Euler's number

10. Which geometric parameter determines the efficiency of the channel?

a. Hydraulic depth
b. Hydraulic radius
c. Section factor
d. Normal depth

11. The flow characteristics of a channel do not change with time at any point. What type of flow is it?

a. Steady flow
b. Uniform flow
c, Laminar flow
d. Turbulent flow

12. For a channel to be economic which of the following parameters should be minimum.

a. Wetted perimeter   b. Wetted area
c. Section factor   d. Hydraulic depth

PART B

ANSWER ANY FOUR OUT OF SIX

(4x7=28)

1. What is a specific energy curve? Draw specific energy curve, and then derive expressions for critical depth and critical velocity.
2. Write a short note: a. Specific energy curve (b) Factors affecting mannin's n
3. Energy dissipation. If it is desired to have an energy loss of 5 m in the jump when the inlet Froude number is 8.5, determine the sequent depths.
4. Describe the types Hydraulic Jump on the basis of Froude Number.
5. Differentiate between the flows with example: (i) Laminar and Turbulent flows (ii) Critical, Sub-critical and Super-critical flow
6. Write short notes on-
   a. Steady Flow   b. Uniform flow   c. Gradually Varied Flow   d. RapidllyVarried Flow

PART C

ANSWER ANY TWO OUT OF FOUR

(2x15=30)

1. A rectangular channel carrying a supercritical stream is to be provided with a hydraulic jump type of energy dissipater. If it is desired to have an energy loss of 5.9 m in the jump when the inlet Froude number is 8.5, determine the sequent depth.
2. For a hydraulic jump in a rectangular channel, derive the following relationship. Also state the assumptions involved in the derivation.
3. EL=(y2-y1) 3 /4y1y2 where, EL is the energy loss, q is the discharge per unit width
4. Write short notes on- a. Alternate Depth   b. Sequent Depth   c. Hydraulic Jump
   Calculate the bottom width of a channel required to carry a discharge of 20 m3 /sec as a critical flow at a depth of 2 m, if the channel section is (a) rectangular, and (b) trapezoidal with side slope of 1.5 horizontal: 1 vertical.

Subject	: Hydrology& Water Resources Engineering	Roll No	: ……….
Course	: B.Tech Civil		
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PART A

MULTIPLE CHOICE QUESTIONS (12x1=12)

1. . Where are funnel and receiver in Non-recording type placed?
   a. Inside a Metal case
   b. On top of the equipment
   c. Below the base of equipment
   d. In between the metal case

2. The base of the non-recording type rainfall is permanently fixed in the concrete block.
   a. True
   b. False

3. Which gauge gives the permanent record of rainfall?
   a. Recording gauge   b. Non-recoding gauge   c Copper daily gauge   d. Plastic gauge

4. What do you call a graph which is plotted for discharge versus time?
   a. Snow Graph   b. Hydrograph   c. Rain graph   d. Fluid graph

5. The runoff is affected by
   a. Size of the basin   b. Elevation of the water shed   c. Shape of the basin   d. All the above

6. Interception losses are due to
   a. Evaporation   b. Transpiration   c. Stream flow   d. None
   The correct answer is
   a. only a.   b. and c.   c. b. and c.   d. a., b. and c.

7. Non-recording rain gauges
   a. Collect the rain whose volume is measured by means of graduated cylinders
   b. Collect the rain which is directly measured by means of graduated cylinders in centimeters of water depth
   c. Are generally used in hilly terrain
   d. Are cylindrical in shape

8. Infiltration capacity of soil depends upon_
   a. Number of voids present in the soil   b. Shape and size of soil particles
   b. Arrangement of soil particles   d. All the above

9. In India the recording type rain gauge generally used, is:-
   a. Weighing type   b. Tipping type   c. Float recording type   d. None of these

10. Ryve's formula for flood estimate in cumecs, is

    a. $Q = CA^{3/4}$ b. $Q = CA^{2/3}$ c. $Q = CA^{1/2}$ d. $Q = CA^{1/4}$

11. A unit hydro graph has one unit of
    a. Rainfall duration   c. Rainfall excess
    b. Time base of direct runoff   d. Discharge

12. Evaporation losses depend upon
    a) Area of the water surface and depth of the water
    b) Nature of precipitation and type of vegetation
    c) Humidity and wind velocity
    d) All the above

PART B

ANSWER ANY FOUR OUT OF SIX   (4x7=28)

1. Explain "Hydrological cycle" with neat sketch.
2. Enlist different recording type of rain gauges and explain any one of type rain gauge with suitable sketch in brief.
3. Explain the following methods for computing average rainfall over a basin. • Arithmetic average method •Thiess's polygon method •Isohyet method
4. Define the term "Infiltration". Describe the factors affecting for infiltration rates
5. Define the term "Evaporation". Describe the factors affecting for evaporation losses.
6. The infiltration capacities of an area at different intervals of time are indicated below. Find an equation for the infiltration capacity in the exponential form. Time (hrs) 0 0.25 0.50 0.75 1.00 1.25 1.50 1.75 2.00 Infiltration capacity (cm/hr) 10.5 5.65 3.20 2.18 1.50 1.25 1.10 1.0 1.0

PART C

ANSWER ANY TWO OUT OF FOUR   (2x15=30)

1. The rain fall recorded at the various rain gauge stations are as follows. Rain gauge station number Precipitation in mm 1 35 2 38 3 41 4 45 5 47 6 50 7 52 8 55 Determine the average rainfall over the catchment by different method
2. 4 Determine optimum number of rain gauges in catchment area from following data. • No. of existing rain gauge = 7 • Mean annual rain fall at the gauges are 1010, 980,900,870, 850, 800, 700 mm. • Permissible error = 8 %
   The rain gauge station X was in operative for a part of a month during storm occurred. The storm rainfall recorded at the three surrounding stations A, B, and C was 75, 55, and 85 mm respectively. If the average annual rainfall of the stations A, B, C, and X are 780, 660,850 and 700 mm respectively. Estimate the storm rainfall of station X.
3. A storm with 150mm precipitation produces a direct runoff of 8.7 cm, with incremental hourly rainfall values being 0.6, 1.35, 2.25, 3.45, 2.7, 2.41, 1.5 and 0.5 com/hr. Estimate the Ø-index of the storm.