

- N. B.: 1. Question number 1 is compulsory.
 2. Attempt any three from remaining questions.
 3. Figures to the right indicate full marks.

1. (a) To find degree of static and kinematic indeterminacy of structures as shown in figure 1. [6]

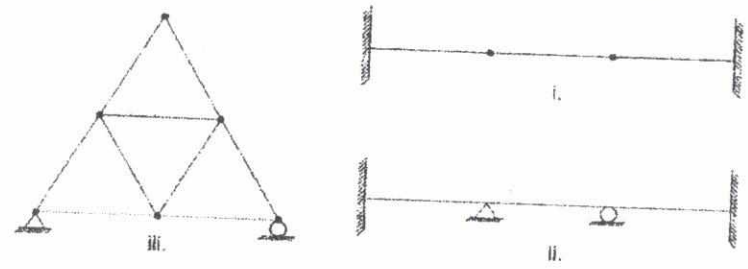


Figure 1

(b) For the frame as shown in figure 2, calculate the horizontal deflection of roller support 'D' due to change in temperature as indicated. Take depth for each member as 500 mm and $\alpha_t = 12 \times 10^{-6}/^\circ\text{C}$. [8]

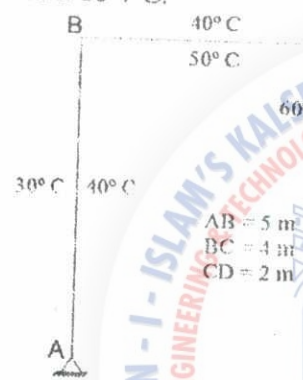


Figure 2

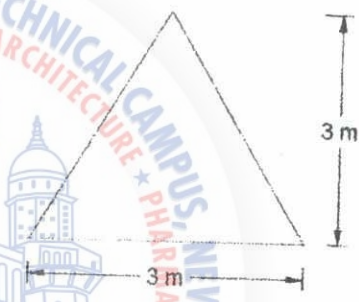


Figure 3

(c) Determine the shape factor for triangle section as shown in figure 3. [6]

OR

Differentiate between Determinate and Indeterminate Structure.

2. (a) A two hinged parabolic arch of span 40 meter and rise 8 m carries uniformly distributed load of 25 kN/m on Left half span. Find the reaction at supports and draw BMD. [10]

(b) Analyse the beam as shown in figure 4 by three moment theorem and draw BMD. [10]

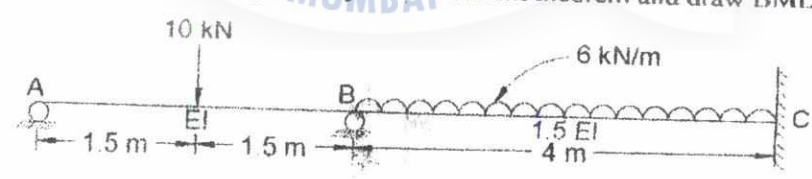


Figure 4

TURN OVER

3. (a) A portal frame ABCD as shown in figure 5. Develop **Flexibility matrix** for respective co-ordinates. [5]
- (b) A portal frame ABCD is loaded and supported as shown in figure 5. Use **Flexibility method** for analysis, draw BMD and deflected shape of the frame. [15]

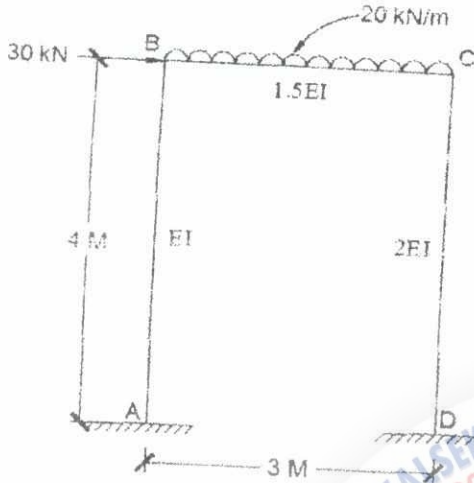


Figure 5

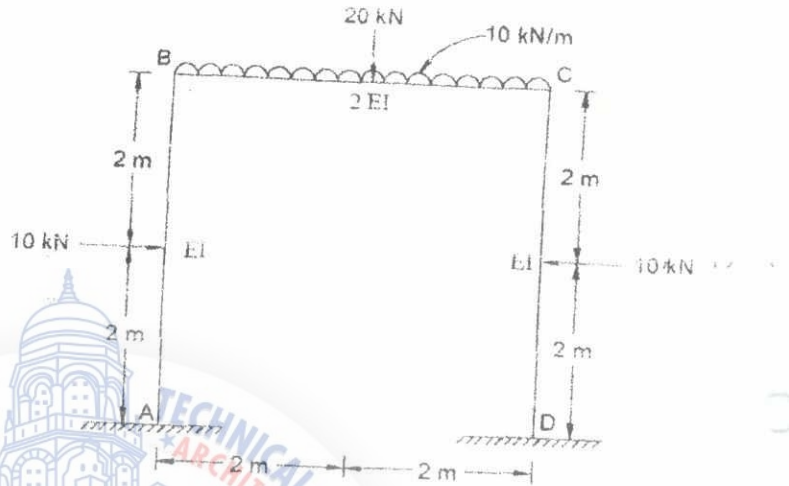


Figure 6

4. (a) A portal frame ABCD as shown in figure 5. Develop **Stiffness matrix** for respective co-ordinates. [5]
- (b) A portal frame ABCD is loaded and supported as shown in figure 5. Use **Flexibility method or Stiffness method** for analysis, draw BMD and deflected shape of the frame. [15]
5. Using **Slope Deflection Method or Moment Distribution Method**, analyse the frame loaded and supported as shown in figure 6. Also draw BMD and deflected shape of the frame. [20]
6. (a) Find the collapse load 'P' for the continuous beam loaded as shown in figure 7. [8]

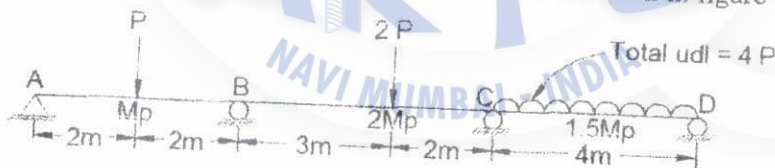


Figure 7

TURN OVER

6. (b) Using Force method, Analyse the pin jointed frame loaded & supported as shown in figure 8. Also find forces in all members. Take AE constant for all members. [12]

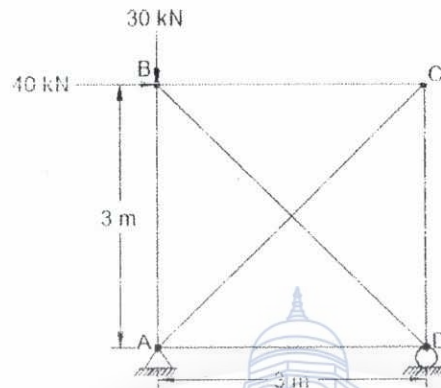


Figure 8



(165)

Q. P. Code: 18505

(3 hours)

[Total Marks :80]

- NB:** 1) Question No. 1 is **Compulsory**.
 2) Attempt **any three** out of remaining **five** Questions.
 3) Assume Suitable wherever necessary.
 4) Numbers to right indicate full marks.

- 1 a) Explain the Role of Geotechnical Engineer in Civil Engineering Practices. 5
 b) Differentiate between Compaction and Consolidation. 5
 c) State the Merits and demerits of Direct shear test. 5
 d) Write Short note on Quick Sand Condition. 5
- 2 a) Derive the relationship between unit weight, dry unit weight, Moisture Content. 5
 b) A soil Sample is found to have the following Properties. Classify the soil according to I.S. Classification System. a) Passing 75micron sieve= 10% b) Passing 4.75 mm sieve= 70 %
 c) Uniformity Coefficient = 8 d) Coefficient of Curvature = 2.8 e) Plasticity Index = 4
 c) The plastic limit of a soil is 25% and its Plasticity index is 8%. When the soil is dried from its state at plastic limit, the volume change is 25% of its volume at plastic limit. Similarly the corresponding volume change from the liquid limit to dry state is 34% of its Volume at Liquid limit. Determine the shrinkage limit and shrinkage ratio. 10
- 3 a) In an Earthen embankment under Construction the bulk unit weight is 16.5 kN/m^3 at water content of 11%. If the water content is to be raised to 15%, compute the quantity of water required to be added per cubic meter of soil? Assume no change in the Void Ratio. 10
 b) Define following 5
 a) Porosity b) Seepage Pressure c) Pore Pressure d) Liquidity Index e) Relative Density
 c) Calculate the Horizontal and Vertical Permeabilities of Soil deposit consisting of three Layers 150 cm, 180cm and 200 cm thick with Permeabilities 10^{-5} , 10^{-7} and 10^{-9} m/sec respectively. 5
- 4 a) Explain the Factors affecting Compaction. 5
 b) In site reclamation project, 2.5m of Graded fill ($\gamma = 22 \text{ kN/m}^3$) were laid in compacted layers over an existing layer of silty clay ($\gamma = 18 \text{ kN/m}^3$) which was 3m thick. This was underlain by a 2m thick layer of gravel ($\gamma = 20 \text{ kN/m}^3$) Assuming that the water table remains at the surface of the silty clay. Draw the effective stress profiles for case i) before the fill is placed and case ii) after the fill has been placed. 10

TURN OVER

Q. P. Code: 18505

e) Discuss Properties and application of Flow net. 5

5 a) An Undrained triaxial Compression strength test was conducted on clayey silt soils, and the following test results are obtained. 10

Specimen No.	1	2	3
σ_3 (kN/m ²) Minor Principle Stress	17	44	56
σ_1 (kN/m ²) Major Principle Stress	157	204	225
u (kN/m ²) Pore Pressure	12	20	22

Determine the shear parameters considering effective stresses.

b) Explain Mohr- Coulomb Failure theory. 5

c) List out assumption made in in Terzaghi's one dimensional consolidation theory. 5

6 a) Discuss with sketch any one boring method used in soil exploration Programme. 5

b) Find the time required for 50% consolidation in a soil of 8m thick, if coefficient of consolidation is 1×10^{-4} cm²/ min. 10

c) Write a note on Geosynthetics. 5



N. B. :

1. Question No. 1 is **compulsory**.
 2. Attempt **any three** questions from remaining **five** questions.
 3. Assume any **data** suitably if **not given** and **state it clearly**.
1. It is proposed to construct a Hospital Building in the suburban area of Thane District. The building is G+1 R.C.C. framed structure, having following requirement. The plot area is 28 m x 26 m.
- | | |
|---|-------------------|
| (a) Entrance Lobby with inquiry counter | : min 4 mt wide |
| (b) Chief Medical Officer's Office | : 40 sq mt |
| (c) Consulting Rooms [4 Nos] | : 10 sq. mt. each |
| (d) Pathology Lab. | : 50 sq mt |
| (e) Radiology Lab | : 50 sq mt |
| (f) Operation Theatre | : 50 sq.mt. |
| (g) ICU | : 50 sq mt |
| (h) Male Ward [10 beds] | : 100 sq mt. |
| (i) Female & Children ward [10 beds] | : 100 sq.mt. |
| (j) Drug Stores | : 30 sq.mt. |
| (k) Canteen | : 50 sq.mt |
| (l) Emergency Ward | : 50 sq.mt |
- Provide spacious waiting area outside consulting rooms, passages, staircase, sanitary unit, parking area etc. as per byelaws. Assume any other requirement if required.
- (a) Draw Ground floor plan. [15]
 - (b) Draw first floor line plan of the building given in Q.No.1. [05]
2. (a) Explain various principle of planning in hospital building. [10]
 (b) Draw the foundation plan of the building given in Q.No.1. [10]
3. (a) Draw the detailed sectional elevation passing through staircase and other important unit of building given in Q.No.1. [15]
 (b) Draw the front elevation the building given in Q.No.1. [05]
4. Draw the two point perspective of the building which you have plan for Q.No.1. [20]
5. (a) Draw the site plan showing proposed built-up area, internal road, parking area, open space etc of the building given in Q.No.1. [10]
 (b) Draw the roof terrace plan of the building in Q.No.1. [10]
6. Write short notes on **any four**: - [20]
 - a) Architectural Compositions
 - b) Built Environment-An integrated approach
 - c) Master Plan and Green Belt
 - d) Town planning
 - e) Green Building

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TE-Civil-Sem-V-CBSGS-AH-T

24/11/17

Q.P.Code: 013329

(3 hours)

Total marks: 80

N.B.: (1) Question no.1 is compulsory.

(2) Attempt any 3 questions out of the remaining 5 questions.

(3) Assume data wherever necessary and clearly mention the assumptions made.

(4) Draw neat figures as required.

- Q1 Solve any four from the following** **20**
- Describe Cavitation phenomenon.
 - Explain in detail Hydraulic similarity.
 - Show that maximum efficiency of propulsion is 50% when the inlet orifices are at right angles to the direction of motion of ship.
 - Explain Multistage Centrifugal Pump.
 - Write a note on Hydraulic Intensifier.
- Q2 a** The pressure drop (ΔP) in a pipe depends upon the mean velocity of flow (v), length of the pipe (l), diameter of pipe (d), viscosity of fluid (μ), average height of roughness projection on inside pipe surface (k) and mass density of fluid (ρ) by using Buckingham's II theorem, obtain a dimensionless expression for ΔP . **10**
- b.** A stationary vane having an inlet angel of zero degree and an outlet angel of 25° receives water at velocity of 50m/s. Determine the components of force acting on it in the direction of the jet velocity and normal to it. Also find the resultant force in magnitude and direction per kg of flow. **10**
- If the vane stated above is moving with a velocity of 20m/s in the direction of jet, calculate the force components in the direction of vane velocity and across it, also the resultant force in magnitude and direction. Calculate the work done and power developed per kg of flow.
- Q3 a** A jet of water moving at 12m/s impinges on the concaved shape symmetrical vane to deflect the jet through 120° . The vane is moving at 5m/s. Find (i) the angle of jet so that there is no shock at inlet (ii) The absolute velocity of the jet at exit both in magnitude and direction and (iii) the work done per sec per N of water. Assume that vane is smooth. **10**

TURN OVER

Q.P.Code: 013329

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- b 250 liters per sec of water is flowing in a pipe having a diameter of 300mm. If the pipe is bent by 135° , find the magnitude and direction of the resultant force on the bend. The pressure of water flowing in the pipe is 390 kPa. 10
- Q4 a An inward flow reaction turbine is supplied $0.233 \text{ m}^3/\text{sec}$ of water under a head of 11m. The wheel vanes are radial at inlet and the inlet diameter is twice the outlet diameter. The velocity of flow is constant and equal to $1.83 \text{ m}/\text{sec}$. The wheel makes 370rpm. Determine (i) guide vane angle, (ii) inlet and outlet diameter of wheel, (iii) the width of the wheel at inlet and exit. Assume that discharge is radial and there are no losses in wheel. Take speed ratio = 0.7. Neglect the thickness of vanes. 10
- b A Kaplan turbine develops 8000HP under an effective head of 5m. Its speed ratio is 2 and flow ratio is 0.6 and the diameter of the boss = 0.35 times the external diameter of the runner. Mechanical efficiency of the turbine is 90%. Calculate the diameter of the runner, speed of runner and also its specific speed. 10
- Q5 a A pelton wheel is receiving water from a penstock with a gross head of 510m. 1/3 of the gross head is lost in friction in the penstock. The rate of flow to the nozzle fitted at the end of the penstock is $2.2 \text{ m}^3/\text{s}$. The angle of deflection of jet is 165° . Determine (i) The power given by water to the runner and (ii) Hydraulic efficiency of the pelton wheel. Take C_v (Coefficient of velocity) = 1 and speed ratio = 0.45. 10
- b A centrifugal pump discharges 7500 liters of water per minute against a total head of 25 m when running at 660 rpm. The outer diameter of the impeller is 600 mm and the ratio of outer to inner diameter is 2. The area of flow through the wheel is 0.06 m^2 . The vanes are set back at an angle of 45° . Water enters the wheel radially and without shock. Calculate (i) manometric efficiency and (ii) vane angle at inlet 10
- Q6 a A centrifugal pump impeller runs at 80 rpm and has outlet vane angle of 60° . The velocity of flow is $2.5 \text{ m}/\text{s}$ throughout and diameter of the impeller at exit is twice that at inlet. If the manometric head is 20 m and the manometric efficiency is 75%. Determine (i) the diameter of impeller at the exit and (ii) inlet vane angle. 10
- b A conical draft tube having inlet and outlet diameters 1.2m and 1.8m discharges water at outlet with a velocity of $3 \text{ m}/\text{s}$. The total length of draft tube is 7.2m and 1.44m of the length of draft tube is immersed in water. If the atmospheric pressure head is 10.3m of water and loss of head due to friction in the draft tube is equal to 0.2 x velocity head at outlet of the tube, determine (i) pressure head at inlet and (ii) efficiency of the draft tube. 10

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TF- sem-~~IV~~ CBSGS-Civil-TF-I

30/11/17

Q. P. Code:-24402

(3 Hours)

[Marks:80]

Note:

- i. Q. No. 1 is compulsory
- ii. Attempt any 3 out of remaining 5
- iii. Support all theory and numerical with neat sketch

1. A Calculate corrected runway length for basic runway length of 4100 meter at an airport site located at 150m above M.S.L. The airport reference temperature is 32.30° C and standard atmospheric temperature is 33.80° C. consider site is horizontal. Also draw layout of airport with scale of $1\text{cm} = 500\text{m}$ use corrected runway length. Take airport area of 4 km x 3 km and show all airport elements, Assume wind is calm in all the direction throughout the year. (10 M)
- B Write a note on (any 2) (10 M)
 - i Requirements of harbor.
 - ii Theories of creep,
 - iii Tram-line method of laying railway Line.
2. A What is ANC and TNC? Design 1 in 8.5 turnout on B.G track which takes off from toe and passes through TNC. Assume heel divergence as 11.4cm. (08 M)
- B Discuss classification of airport as per ICAO. (06 M)
- C Discuss on various ballast materials. (06 M)
3. A Design an exit taxiway connecting runway and parallel taxiway for total angle of turning as 35° . Turning speed is 80kmph, take coefficient of friction as 0.12. assume any other data if required. (08 M)
- B Discuss Instrumental landing system with sketch. (06 M)
- C Write note on airport drainage. (06 M)
4. A Discuss characteristics of Concrete, Timber and cast-iron sleepers on basis of suitability, durability, cost and weight. (08 M)
- B What are Special Breakwaters? (06 M)
- C Discuss on airport lighting. (06 M)
5. A Explain Negative Super elevation with neat sketch and find the speed on main curve if a 5° curve diverges from a 3° main curve on a B.G yard assuming the speed of branch line is 35 kmph. (08 M)
- B Explain dry docks and also compare ports and harbor. (06 M)
- C Explain marshalling yard. (06 M)

Q. P. Code:-24402

6. A Design the number of gates to serve three classes of aircraft for obtaining Combined (05 M)
handling capacity of all the gates as 20 aircrafts per hour. Use following data, assuming
that each gate is available for all the aircrafts class assume any other suitable data if required

Aircraft class	Mix (%)	Average Occupancy Time (min)
1	15	25
2	35	45
3	50	60

B. Write note on any 3

- i. Types of rails.
- ii. Konkan railway
- iii. Dolphin
- iv. Fenders
- v. 3 controls of aircraft.

