



AIKTC/KRRC/SoET/ACKN/QUES/2018-19/

Date: \_\_\_\_\_

School: SoET-CBSGS Branch: CIVIL ENGG. SEM: V

To,  
 Exam Controller,  
 AIKTC, New Panvel,

Dear Sir/Madam,

Received with thanks the following <sup>✓</sup>Semester/<sup>✓</sup>Unit Test-I/Unit Test-II (Reg./ATKT) question papers from your exam cell:

Sr. No.	Subject Name	Subject Code	Format		No. of Copies
			SC	HC	
1	Structural Analysis – II	CE-C501		✓	02
2	Geotechnical Engg.	CE-C502		✓	02
3	Bldg. Design And Drawing – II	CE-C503		—	—
4	Applied Hydrolics-I	CE-C504		✓	02
5	Transportation Engg. – I	CE-C505		✓	02
6	Employment & Corporate Skills	CE-C506		—	—

Note: SC – Softcopy, HC - Hardecopy

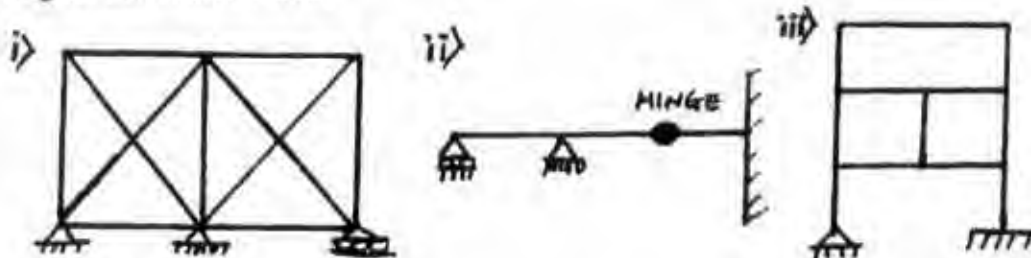
(Shaheen Ansari)  
 Librarian, AIKTC

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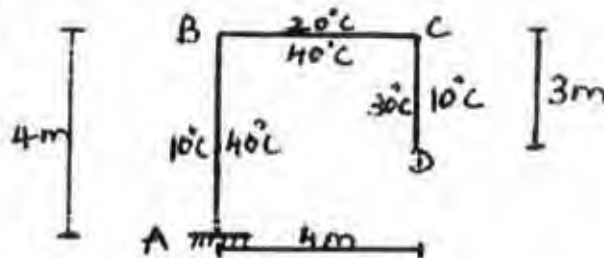
N.B. (1) Question No 1 is compulsory

- (2) Attempt any **three** out of remaining five questions
- (3) Assume suitable data wherever required and state it clearly
- (4) Figures to right indicate full marks

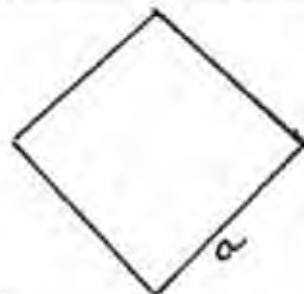
Q 1 . (a) Determine the degree of static and kinematic indeterminacy for the following structures. 06  
Neglect axial deformation



(b) For the rigid jointed frame subjected to temperature variation as shown in the fig. Find the horizontal deflection at D. Assume  $\alpha = 12 \times 10^{-6} / ^\circ C$ . and depth of all members as 750 mm. (Neglect effect of axial forces) 06



(c) Determine shape factor of Diamond section as shown in Fig 04

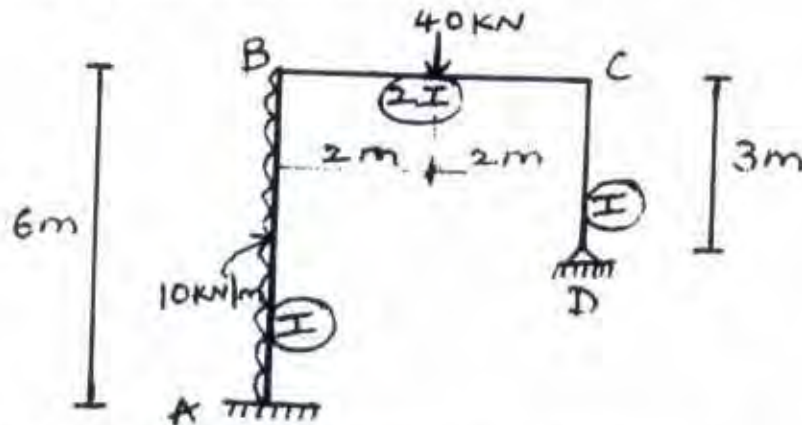


(d) Define the following terms 04  
(i) Carry over factor and distribution Factor  
(ii) Plastic Hinge and Plastic Mechanism

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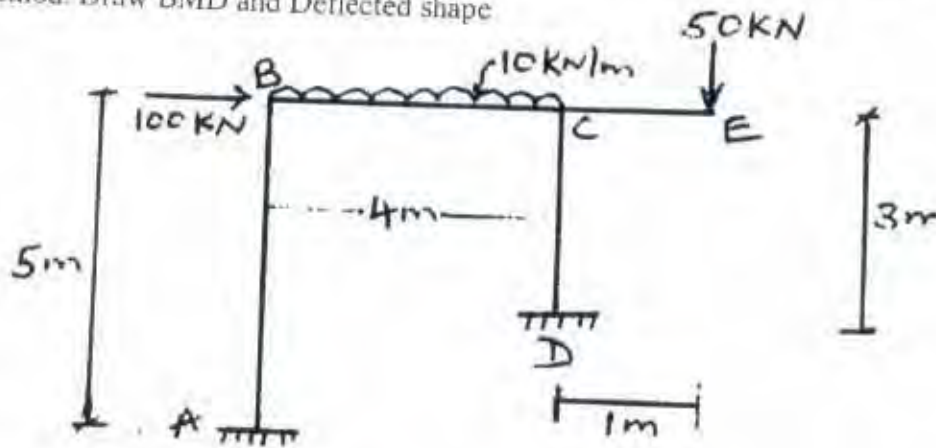
Q 2. Using **Flexibility method** Analyze the Frame loaded and supported as shown in the fig. Also draw BMD and deflected shape

20



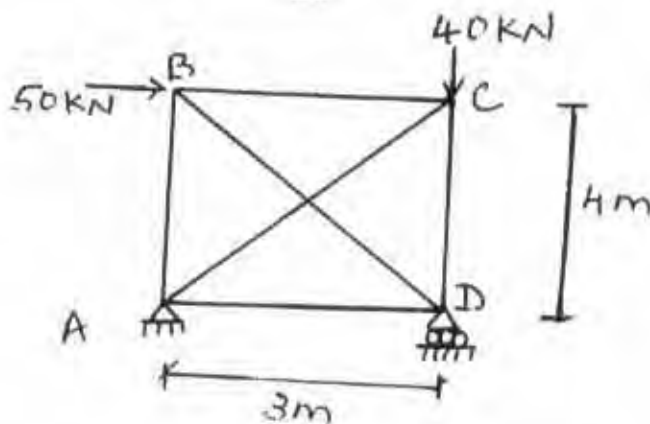
Q 3. (a) Analyze the rigid jointed plane frame as shown in the fig. Using **Slope deflection Method**. Draw BMD and Deflected shape

12



(b) Using **force method** Analyze the pin jointed frame loaded and supported as shown in the fig. Take  $AE = \text{Constant}$

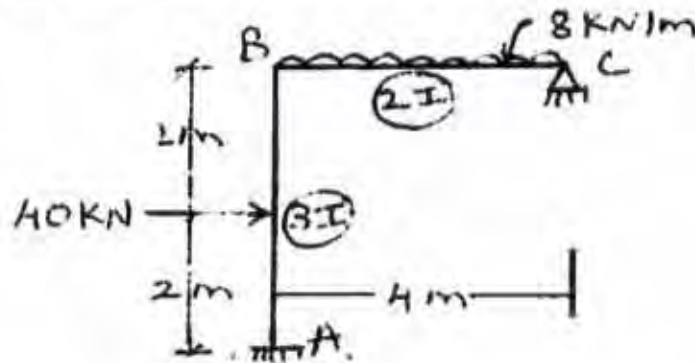
08



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Q 4. (a) Analyze the rigid jointed plane frame as shown in the fig. Using **Stiffness Method** 12

Draw BMD.

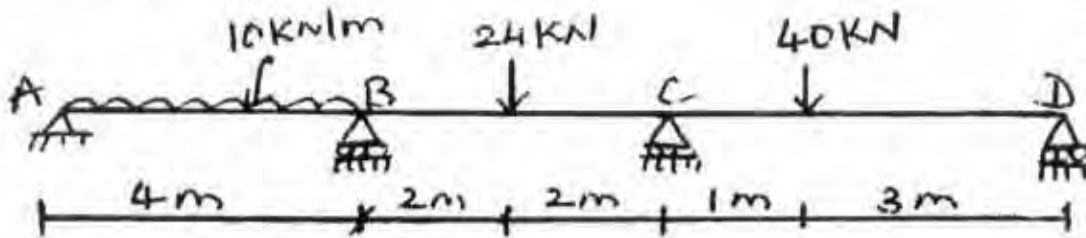


(b) A **two hinged parabolic arch** of span 40 m and central rise 8 m carries a Udl of 08

35 kN/m on left half of the span. Find the reactions and draw the BMD of arch showing location and magnitude of maximum +ve and maximum -ve BM.

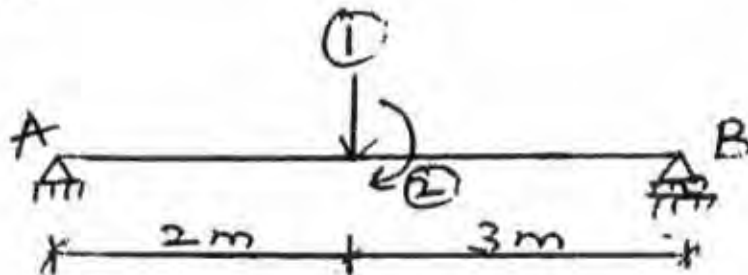
Q 5. (a) Calculate the plastic moment carrying capacity for the continuous beam as shown 10

in the fig



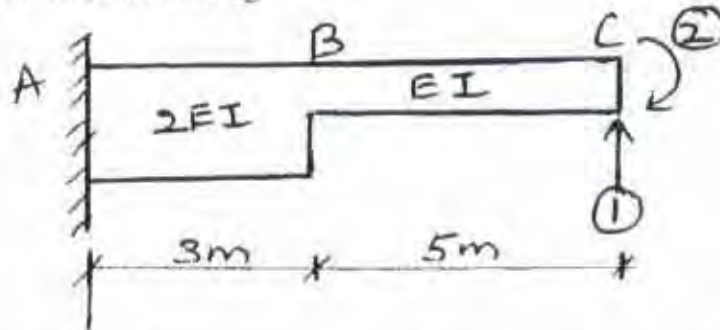
(b) Develop the **stiffness matrix** for the member AB with reference to co-ordinates as 05

shown in the fig

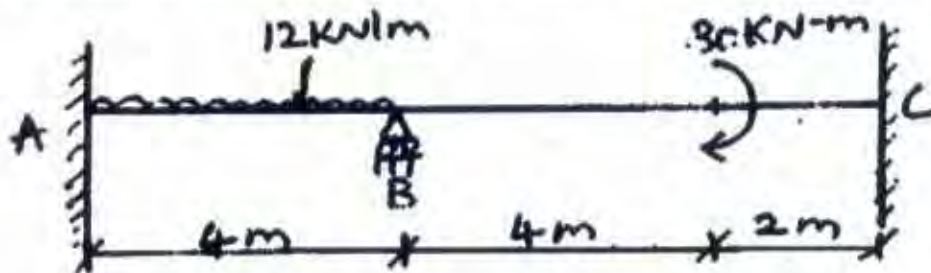


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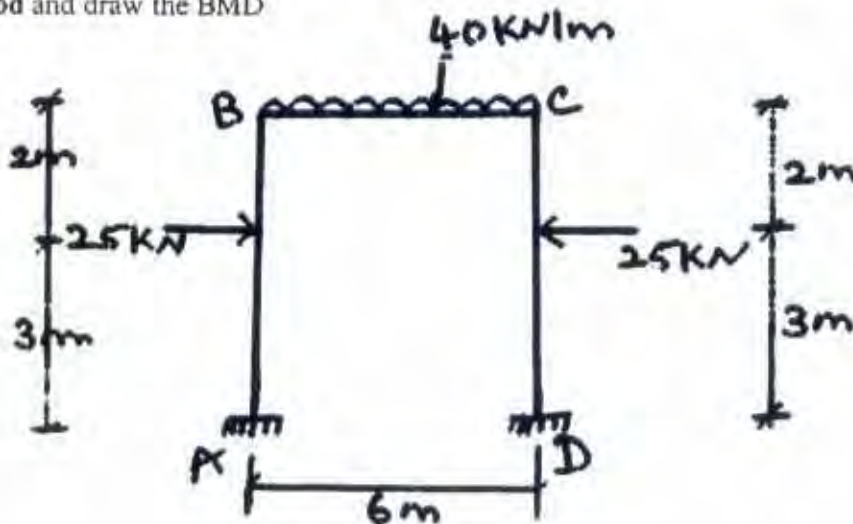
- (c) Develop the **Flexibility matrix** for the non prismatic beam with reference to co-ordinates as shown in the fig 05



- Q.6 (a). Using **Three moment theorem** analyze the beam loaded as shown in the figure and draw the BMD. Support B settles down by 6mm and  $EI = 20,000 \text{ KN-m}^2$  08



- (b). Analyze the rigid jointed plane frame as shown in the fig, by **Moment distribution method** and draw the BMD 12



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TE - Sem-V - CBS45 - Civ

28/5/19

Paper / Subject Code: 30204 / GEOTECHNICAL ENGINEERING-I

(3 Hours)

Marks : 80

- N. B.:
- (1) Question No. 1 is compulsory.
  - (2) Attempt any three from remaining five questions.
  - (3) Figures to the right indicate the full marks.
  - (4) Assume suitable data if not given and justify the same.
- Q. 1
- |    |   |    |
|----|---|----|
| A. | Define the soil and differentiate between soil and rock.                                | 05 |
| B. | Explain the zero air void line in compaction.   | 05 |
| C. | Write the advantages and disadvantages of direct shear test.                            | 05 |
| D. | Define coefficient of consolidation, compression index, coefficient of compressibility. | 05 |
- Q. 2
- |    |  |    |
|----|--|----|
| A. | Sandy soil in a borrow pit has unit weight of solids as $26 \text{ kN/m}^3$ , water content equal to 12% and bulk unit weight is $16 \text{ kN/m}^3$ . How many cubic meter of compacted fill could be constructed of $3600 \text{ m}^3$ of sand excavated from the borrow pit. If the porosity of compacted fill is 30%. Also determine the change in degree of saturation. | 10 |
| B. | Write a note on border classification of soil with examples.   | 05 |
| C. | Explain the standard penetration test.   | 05 |
- Q. 3
- |    |  |    |
|----|--|----|
| A. | A pumping out test was carried out at a level site, where 9 m of clay overlies a stratum of sand 1.5 m thick. The sand stratum is underlain by an impermeable rock stratum. When steady state was reached the rate of flow was found to be 15 liters/sec. The water levels in two piezometers located at radial distances of 6 m and 15 m from axis of main well were 5 m and 4.5 m below ground surface. Compute the coefficient of permeability of the sand stratum. | 10 |
| B. | Write a note on number of bore holes and spacing of bore holes.  | 05 |
| C. | Explain the neutral stress, total and effective stress.  | 05 |
- Q. 4
- |    |  |    |
|----|--|----|
| A. | Write the use of flow net.   | 05 |
| B. | Explain the spring analogy for understanding the concept of primary consolidation. | 05 |

Q. 4 C. A deposit of sand has a porosity of 40% and  $G = 2.7$ . The ground water table is 2 m below ground surface. Compute the effective stress at a depth of 6 m below ground surface, if capillary rise above water table is 1 m. 10

Q. 5 A. Define liquidity index, consistency index, flow index and sensitivity. 05

B. Using the data given below classify the soil as per IS 1498. 05  
Passing 75  $\mu$  sieve = 65%. Liquid Limit = 48% and Plastic limit = 34%.

C. The following table gives data obtained from a direct shear test conducted on samples of compacted sand. The shear box dimensions are 60 mm  $\times$  60 mm. 10

Normal load (N)	Shear load at failure (N)	
	Peak	Ultimate
110	95	65
225	195	135
340	294	200

Determine the peak and ultimate angle of shearing resistance of sand

Q. 6 A. Explain flow line, equipotential line, flow channel, and field. 05

B. Explain the factors affecting the permeability 05

C. In a consolidation test void ratio decreased from 0.70 to 0.65 when the load was changed from 50 kPa to 100 kPa. Compute the compression index and coefficient of volume change. 05

D. Define optimum moisture content, placement water content and effect of compactive effort on compaction. 05

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(3 hours)

Total marks : 80

N.B:(1) Question no. 01 is compulsory.

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

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

(4) Draw neat figures as required.

Q1:- Attempt Any Four

(20)

- State and derive moment of momentum equation.
- Explain the term similitude.
- What is jet propulsion of ship? Explain with neat sketch.
- Explain unit quantities of turbine.
- What is cavitation? State the causes and effects of cavitations in centrifugal pump.
- Write short note on hydraulic ramp.

Q2:-

- A  $45^\circ$  reducing bend connected in pipe line, the diameter of at inlet and outlet of the bend being 400mm and 200mm respectively. Find the force exerted by water on the bend if intensity of pressure at inlet of the bend is  $215.8 \text{ kN/m}^2$ . The rate of flow of water is  $0.5 \text{ m}^3/\text{s}$ . (10)
- A water sprinkler has 10mm diameter nozzle at either end of a rotating arm, each of which is discharging water in opposite directions at right angle to the rotating arm, at a velocity of 8 m/s. If the axis of rotation is at a distance of 0.15 m from one end and 0.2 m from the other, determine the torque required to hold the arm stationary. If friction is neglected, determine the constant angular speed of the arm. (10)

Q3:-

- The pressure difference  $\Delta p$  in a pipe of diameter  $D$  and length  $l$  due to viscous flow depends on the velocity  $v$ , viscosity  $\mu$  and density  $\rho$ . Using Buckingham's  $\Pi$  - theorem, obtain an expression for  $\Delta p$ . (10)
- A jet of water having a velocity of 30 m/s strikes a curve vane, which is moving with a velocity of 15 m/s. The jet makes an angle of  $30^\circ$  with the direction of motion of vane at inlet and leaves at an angle of  $120^\circ$  to the direction of vane at outlet. Calculate i) Vane angles, so that the water enters and leaves the vane without shock. ii) Work done per sec per unit weight of water striking the vane per second. (10)

Q4:-

- Penstock supplies water from a reservoir to the Pelton wheel with a gross head of 500 m.  $1/3^{\text{rd}}$  of the gross head is lost in friction in the Penstock. The rate of flow of water through the nozzle fitted at the end of the penstock is  $2.0 \text{ m}^3/\text{s}$ . The angle of deflection of jet is  $165^\circ$ . Determine the power given by the water to the runner and also hydraulic efficiency of the Pelton wheel. Take speed ratio  $i=0.45$  and  $C_v = 1.0$ . (10)



- b) A Kaplan turbine working under a head of 20m develops 1100 KW shaft power. (10)  
The outer diameter of the runner is 3m and hub diameter 1.5m. The guide blade angle at the extreme edge of the runner is  $35^\circ$ . The hydraulic and overall efficiencies of the turbine are 86% and 82% respectively. If the velocity of whirl is zero at outlet, determine i) Runner vane angles at inlet and outlet at the extreme edge of the runner and ii) Speed of the turbine.

Q5:-

- a) i) Derive an expression for specific speed of turbine. (05)  
ii) What is manometric efficiency, mechanical efficiency and overall efficiency of turbine. (05)
- b) A centrifugal pump is running at 1000 rpm. The outlet vane angle of the impeller is  $30^\circ$  (10)  
and velocity of flow at outlet is 3 m/sec. The pump is working against a total head of 30 m and the discharge through the pump is  $0.3 \text{ m}^3/\text{s}$ . If the manometric efficiency of the pump is 75 % determine  
i) the diameter of the impeller and  
ii) The width of the impeller at the outlet.

Q6:-

- a) i) Write short note on multistage centrifugal pump. (05)  
ii) Explain hydraulic intensifier with neat sketch. (05)
- b) i) A jet of water of diameter 50mm moving with a velocity of 20 m/s strikes (05)  
a fix plate in such a way that the angle between jet and the plate is  $60^\circ$ . Find the force exerted by the jet on the plate in the direction normal to the plate.  
ii) Water is flowing through a pipe of diameter 30 cm at a velocity of 4 m/s. Find the velocity (05)  
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 Specific gravity of oil = 0.8.

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3

TE-Sem-V- (BSGS - CIV)

21/5/19

Paper / Subject Code: 30203 / TRANSPORTATION ENGINEERING - I

Q.P.Code: 018124

(3 Hours)

[Total marks: 80]

- Note**
1. Question No 1 is compulsory.
  2. Attempt Any 3 out of remaining
  3. Assume any suitable data wherever required.
- Q.1**
- a. Discuss the role of railway in industrial and economic progress of a nation 5
  - b. Explain negative super elevation by a neat sketch 5
  - c. Define creep? How it is measured 5
  - d. Explain different types of joints provided in rail 5
- Q.2**
- a. Write short notes on ( Answer any three out of six ) 10
    - i. Airport drainage
    - ii. Cross wind component
    - iii. Airport marking and lighting
    - iv. Longitudinal gradient of runway
    - v. Classification of airport as per ICAO
    - vi. Clam period
  - b. Explain the necessity of sleepers in railway track. Using sleeper density of M+6. Estimate the quantity of track material required for constructing a B.G railway track that is 6km long? 10
- Q.3**
- a. Explain the different types of Railway yards and their functions with neat diagrams 10
  - b. Explain in brief the factors to be considered while selecting the site for airport 5
  - c. Draw the neat sketch of layout of artificial Harboui 5

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- Q.4
- a. Design the Exit runway joining a runway and a parallel main taxiway. The total angle of turn is  $35^\circ$  and the maximum turn-off speed is 80 Kmph 10
  - b. What is ballast? Why is it used in the railway track? Briefly describe the various types of ballast used? 10
- Q.5
- a. What would be the Equilibrium Cant on BG track of  $7^\circ$  for an average speed of train 70KMPH? Also calculate the maximum permissible speed after allowing the maximum cant deficiency? 10
  - b. Explain the working of Semaphore Signals with neat sketch 10
- Q.6
- a. Explain Wind rose diagram? What is its utility and its types? Explain each type with neat sketches? 10
  - b. mention the types of harbours and ports in India 5
  - c. Briefly describe the significance of Airport drainage 5
-