T.E./Insem.-605
T.E.(Civil) (Semester - I)
FLUID MECHANICS - II
(2015 Pattern)

Time : 1 Hour]   *[Max. Marks :30*

Instructions to the candidates:
1) *Answer Q.1 or Q.2, Q.3 or Q.4 and Q.5 or Q.6*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks*
4) *Use of non programmable electronic pocket calculator is allowed.*
5) *Assume suitable data, if necessary.*

Q1) a) Determine the frequency of vortex shedding for a 4 mm diameter transmission cable in wind of 73 km/hr speed at 20°C. Take $\mu=1.86\times10^{-5}$ N.s/m^2 and ρ_{air} = 1.21 kg/m^3. **[3]**

b) Explain with neat sketch the term "Polar Diagram". **[3]**

c) The water is flowing with a velocity of 1.6 m/s in a pipe of length 2600m and of diameter 500mm; the thickness of the pipe wall is 10mm and the valve is closed suddenly at the end of the pipe. Find the rise in pressure if the pipe is considered to be elastic. Take E = 19.62×10^{10} N/m^2 for pipe material and K=19.62×10^4N/cm^2 for water. Calculate the circumferential and longitudinal stress developed in the pipe wall. **[4]**

OR

Q2) a) Derive the following expression for rise in pressure due to instantaneous closure of valve in elastic pipe. **[4]**

$$P = V\sqrt{\frac{\rho}{\left(\frac{1}{K} + \frac{D}{E.t}\right)}}$$

b) A man descends to the ground from an areoplane with the help of a parachute which is hemispherical having a diameter of 4.5 m against the resistance of air with a uniform velocity of 25m/s. Find the weight of the man if the weight of parachute is 9.81N. Take C_D=0.6 and ρ_{air}=1.24 kg/m^3. **[4]**

c) Explain with neat sketch the following term:
i) Lift force
ii) Drag force **[2]**

Q3) a) Calculate the critical depth and the corresponding specific energy for a discharge of 4 m³/s for the following channels.
   i) Rectangular channel of width 3m
   ii) Triangular channel with side slope 0.5H: 1V **[4]**

b) The rectangular channel of width 8m, carries a discharge of 17 m³/s with depth of flow of water is 1.5m. Calculate:
   i) specific energy
   ii) critical depth
   iii) critical velocity and
   iv) minimum specific energy. **[4]**

c) Explain in brief with neat sketches "Velocity distribution in open channel".**[2]**

OR

Q4) a) A rectangular channel 5.3m wide has a discharge of 10.50 m³/s at a velocity of 1.3m/s. At a certain section the bed width is reduced to 3.0 m through a smooth transition. A smooth flat hump is to be built in this contracted section to cause critical flow for flow measurement purposes. Estimate the height of the hump necessary for this purpose. Assume no energy loss at the transition (Refer Fig. 4 a). **[5]**

Fig: 4(a)
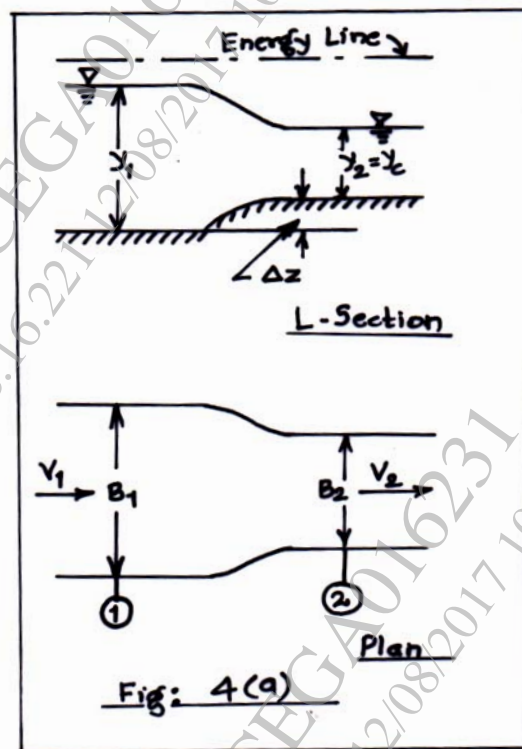
b) Derive the Continuity equation with usual notations for open channel flow. **[5]**

Q5) a) A trapezoidal channel with side slopes of 2 Horizontal: lVertical, is to be designed as the most efficient channel to carry 15 m^3/s discharge at a slope of 1/6000. Assuming Manning's n = 0.012, determine the dimensions of the channel section and draw the cross section of channel. **[5]**

b) Derive the expression for the "loss of energy" with usual notations for a hydraulic jump. **[5]**

OR

Q6) a) Explain in detail various "types of hydraulic jump" with neat sketches. **[5]**

b) Derive the conditions for most efficient triangular channel section. **[5]**

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T.E./Insem.-601
T.E. (Civil) (Semester - I)
HYDROLOGY AND WATER RESOURCES ENGINEERING
(2015 Pattern)

Time : 1 Hour]   *[Max. Marks :30*

Instructions to the candidates:

1) *Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right indicate full marks.*
4) *Assume suitable data, if necessary.*

Q1) a)   Explain in brief various forms of precipitation.   **[5]**

b)   Explain the different factors affecting evaporation of water from reservoir.   **[5]**

OR

Q2) a)   Discuss the construction and applications of DAD curves with neat sketch.   **[5]**

b)   In a basin a 10 hrs storm rainfall gives the following depths.   **[5]**

Rainfall (hr)	1	2	3	4	5	6	7	8	9	10
Depth of Water (cm)	2.0	2.75	6.5	4.0	9.5	5.0	8.2	10.0	5	1.5

The surface runoff resulting from the above storm is equivalent to 22.5 cm of depth over the basin. Calculate average infiltration index for the basin.

Q3) a)   What is duty? State factors affecting & explain methods of improving duty.   **[6]**

b)   Write merits & demerits of drip irrigation system.   **[4]**

Q4) a) List various methods of assessing canal revenue. Explain volumetric basis method with merits & demerits. **[5]**

b) A water course has a culturable commanded area of 1500 hectares. The intensity of irrigation for crop A is 45% and for B is 40%, both the crops being rabi crops. Crop A has a kor period of 20 days and crop B has kor period of 15 days. Calculate the discharge of water course if the kor depth for crop A is 10 cm and for B it is 16 cm. **[5]**

Q5) a) Define the following terms: **[5]**

i) Specific Yield of an acquifer.

ii) Transmissivity.

iii) Aquifuge.

iv) Aquatard

v) Porosity.

b) Differentiate between shallow wells and deep wells. **[5]**

OR

Q6) a) What are the assumption made in the analysis of radial flow towards a well. Derive a relation for the discharge of a well in a recuperation test.**[6]**

b) During a recuperation test, the water level in an open well was depressed by pumping by 3m and it recuperated to 2.0m in 90 minutes.

i) Determine the yield from a well of 5m diameter under a depression head of 3.5m.

ii) Also find out the diameter of the well to yield 12 l/sec under a depression head of 2.5m.

[4]

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T.E./Insem.-602
T.E. (Civil) (Semester - I)
INFRASTRUCTURE ENGINEERING & CONSTRUCTION TECHNIQUES
(2015 Pattern)

Time : 1 Hour] **[Max. Marks :30**

Instructions to the candidates:
1) Answer Q1 or Q2, Q3 or Q4, Q5 or Q6.
2) Neat diagrams must be drawn wherever necessary.
3) Figures to the right side indicate full marks.
4) Assume suitable data if necessary.

Q1) a) What is the scope of Infrastructure Engineering in National and Global development? **[5]**

b) Define and Draw a neat labeled diagram of Permanent Way. **[3]**

c) Differentiate between Metro Rail and Mono Rail. **[2]**

OR

Q2) a) What are the advantages and disadvantages of PPP? **[4]**

b) Explain with neat labeled diagram coning of rails and Tilting of Rails. **[6]**

Q3) a) Define the following.(Any Four) **[4]**
   i) Cant Deficiency
   ii) Super elevation
   iii) Equilibrium Speed
   iv) Negative Cant
   v) Pusher Gradient

b) What are the ill effects on rail joints and their remedial measures? **[6]**

P.T.O.

Q4) a) Write short note on Short and Long welded rails. **[4]**

b) Define points and crossing. Draw a neat labeled diagram of turnout. **[6]**

Q5) a) Why is there necessity of Mechanization? **[4]**

b) Mention the various methods of dewatering system. Explain any one method with suitable sketch. **[6]**

OR

Q6) a) Define the term dredging. Explain any one type of dredging technique. **[5]**

b) What are the advantages and disadvantages of Prefabrication? **[5]**

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T.E./Insem.-604
T.E. (Civil Engineering)
STRUCTURAL ANALYSIS - II
(2015 Pattern)

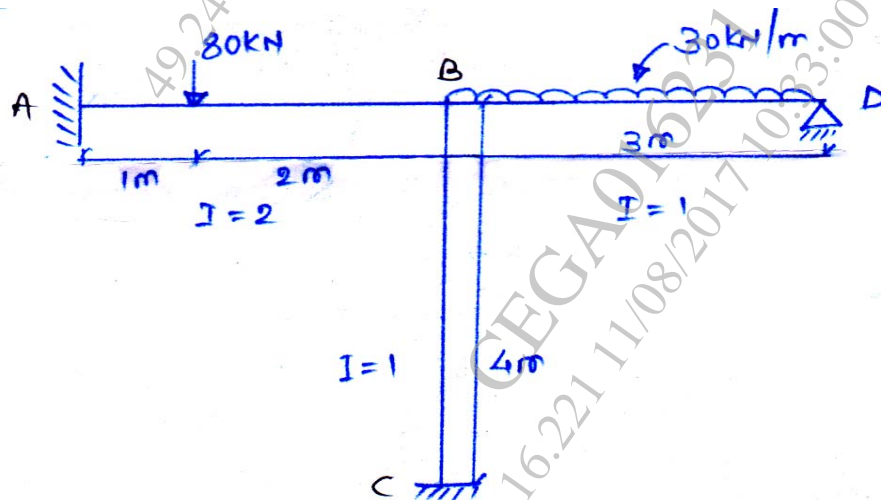*Time : 1 Hour]*   *[Max. Marks :30*

Instructions to the candidates:
  1) *Solve Q1 or Q2, Q3 or Q4, Q5 or Q6.*
  2) *Figures to the right indicate full marks.*
  3) *Assume suitable data, if necessary.*
  4) *Use of calculator is allowed.*

Q1) Analyse the contineous beam ABCD by slope deflection method. Draw BMD. **[10]**
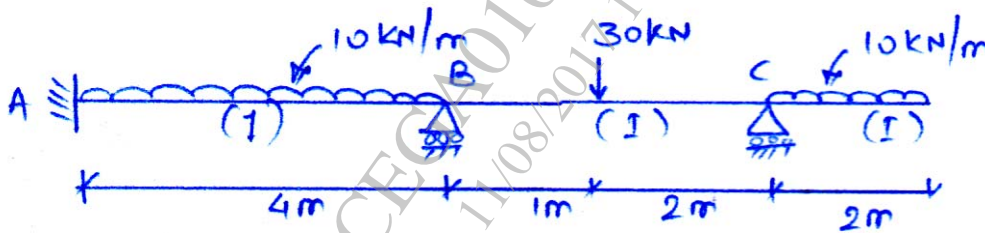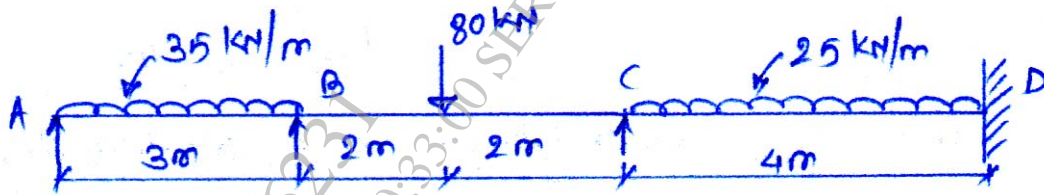

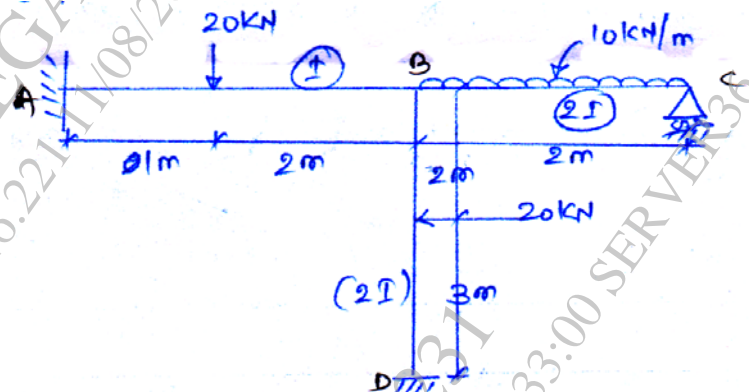**Q2)** Analyse the portal frame shown in fig. by slope deflection method. Draw BMD. **[10]**
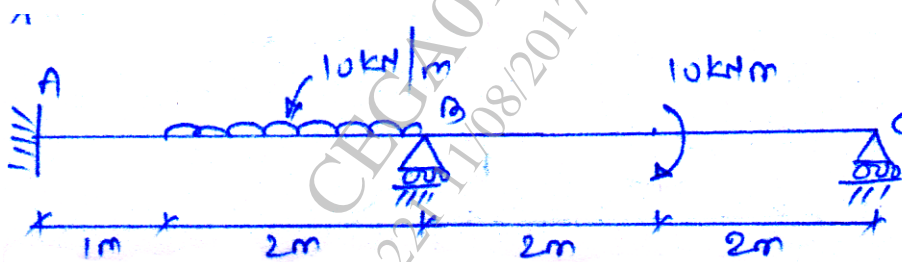
Q3) Analyse the continuous beam by moment distribution method. Draw BMD. **[10]**
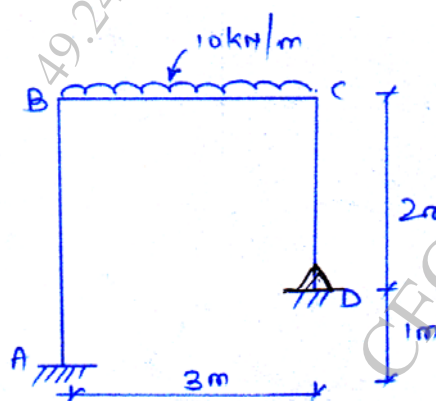

Q4) Analyse the frame shown in fig.by the moment distribution method. Draw BMD. **[10]**

Q5) Analyse the beam shown in fig. by flexibility method. Draw BMD. **[10]**

Q6) Analyse the frame shown in fig. by flexibility method. **[10]**

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T.E/Insem.-604

T.E./Insem.-603
T.E. Civil (Semester-I)
STRUCTURAL; DESIGN -I
(2015 Course)

Time : 1 Hrs. 30 Min.]   *[Max. Marks : 30*

Instructions to the candidates:

1) *Answer Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6.*

2) *Neat sketches must be drawn wherever necessary.*

3) *Figures to the right indicate full marks.*

4) *Take Fe 410 grade of steel.*

5) *Take ultimate stress in bolt, f_{ub} = 400 N/mm².*

6) *Assume suitable data, if necessary.*

7) *Use of electronic pocket calculator IS: 800-2007 and steel table allowed.*

8) *Use of cell phone is prohibited in the examination hall.*

Q1) a) State and explain application of tension member with its cross section in industrial steel structures.   **[4]**

b) Determine design tensile strength due to yielding and rupture of an ISA 90 × 90 × 6 @ 8.2 kg/m which is connected to the 8 mm thick gusset plate by 3 number of M20 black bolts of 4.6 grades.   **[6]**

OR

Q2) a) State and explain classification of hot rolled steel section with stress diagram.   **[4]**

b) Design a tie member of length 2.3 m in a truss to carry axial tension 150 kN using single unequal angle section. Assume angle is connected to 8 mm thick gusset plate by 4 numbers of M20 bolts.   **[6]**

Q3) a) Explain in brief effective length of compression members of truss using angle sections.   **[4]**

P.T.O

b) Check the adequacy of two-ISA 70 × 70 ×6 @ 6.3 kg/m subjected to factored compressive force 200 kN. Assume angles are connected back to back on opposite side of 8 mm thick gusset plate by fillet weld. Assume length of strut is 2.5 m. **[6]**

OR

Q4) a) A 6 m long column is effectively held in position at both ends and restrained against rotation at one end. If an ISHB 400 @ 77.4 kg/m is used, calculate design compressive strength of the column. **[4]**

b) A column 10 m long consist 2-ISMC 300 @ 35.8 kg/m spaced 200 mm back to back to carry a factored load of 1100 kN. The column is restrained in position but not in direction at both ends. Design a batten system with bolted connection. **[6]**

Q5) Explain types of column bases and design the size of slab base for a column ISHB 350 @ 67.4 kg/m supporting a factored axial compression of 1200 kN. Consider grade of concrete as M20. **[10]**

OR

Q6) Check the adequacy of ISHB 450 @ 85.4 kg/m to carry a factored compressive load of 750 kN at an eccentricity of 270 mm about major axis. The effective length of column is 3 m. Consider only section strength. **[10]**

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