B.E. (Civil Engineering) Sixth Semester (C.B.S.)

Steel Structures

P. Pages : 2 **AHK/KW/19/2223**

Time : Four Hours * 1 0 5 4 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Assume suitable data whenever necessary.
7. Use IS 800-2007, is permitted & use of steel table is permitted.

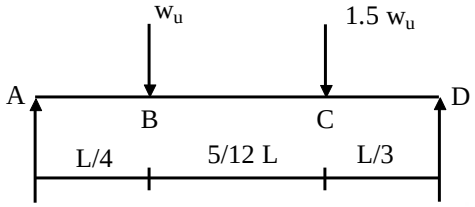
1. a) An unequal angle 1.5m Long, of a truss is connected to gusset plate. It Carries ultimate tension of 230kN. Design section using bolted connection. Assume fy = 250 MPa & fu = 410 MPa. **10**

b) Determine the shape factor & plastic moment of resistance about centroidal x-x axis of an. I- section, having Top flange 150x25 mm. Bottom flange 200 x 25 mm & web 8x425 mm. (Take x – x axis parallel to width of flange). **10**

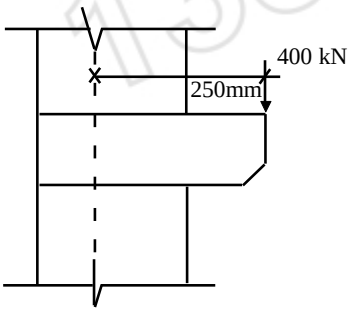
OR

2. a) Design a single angle discontinuous strut to carry a factored axial compressive load of 65kN. The length of strut is 3.0 m between the intersection. It is connected to 12 mm thick gusset plate by 16mm diameter bolt of class 4.6. Use grade of steel. Fe410. **10**

b) Find the collapse load for the beam as shown in fig:1. **10**



3. a) A bracket plate connected to flange of column ISHB 350 @ 0.674 kN/m through 16 mm diameter bolt is subjected to factored load of 400kN. at the eccentricity of 250 mm from center line of web of column as shown in figure. Assume load and bolt plane being the same. Design the connection. **10**



b) Find the efficiency of single botted lap joint connecting two plates of 6mm thickness with 16mm diameter bolt at the pitch of 60mm. Consider an ordinary bolt of class 4.6 and plate of grade Fe410. **10**

OR

4. a) A beam ISMB 400 transfers a factored reaction of 250kN to the column flange ISNB 200 Design the stiffened seat angle connection use bolt of grade 4.6 **10**

b) A secondary beam ISLB 350 @ 49.5 kg/m is to connect to main beam ISMB 600 @ 122.6 kg/m The secondary beam transfer the safe reaction of 375kN. Design the connection. **10**

5. Design the laterally restrained simply supported steel beam of effective span 5.5m. Subjected to working UDL of 50kN/m. Over the entire span inclusive of self weight. Assume width of support as 230 mm. Do all necessary checks as per relevant IS code. **20**

OR

6. A welded plate girder of span 25m is laterally restrained through out its length it carries the service UDL of 45kN/ m over the entire span inclusive of self weight. Design the following. **20**

i) C/s of girder

ii) End bearing Stiffeners

iii) Connection of flange to web.

7. Design the built up column using two channels arranged face to face to resist the service load of 850kN. The length column is 8.0m which is effectively held in position at both ends but not restrained against rotation at one end. Use single lacing system and bolted joint. **20**

OR

8. a) Design a slab base for a column section ISHB 200 which carries a factored axial compression of 1000kN. The grade of steel is E250 and grade of concrete is M20. **8**

b) A beam column of effective length of 6.5m. Carries the service axial load of 475kN and equal end moment of 45kN-m. each about the major axis. Design the section using single rolled steel section. Assume the sway of member is prevented and column bends either in single or in double curvature. **12**

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B.E. (Civil Engineering) Sixth Semester (C.B.S.)

Surveying-II

P. Pages : 3 **AHK/KW/19/2224**

Time : Three Hours * 1 0 5 5 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Diagrams and chemical equations should be given whenever necessary.
11. Illustrate your answers whenever necessary with the help of neat sketches.
12. Use of non programmable calculator is permitted.

1. a) Two distances of 20.0m and 100.0m were accurately measured out and the intercepts on the staff between the outer sliding webs were 0.196m at the former distance and 0.996m at the later. Calculate the tachometric constants. **5**

b) Explain movable hair method of tacheometry. **4**

c) Explain the working of Jeffcott direct reading tacheometer. **4**

OR

2. a) Determine multiplying constants of a tacheometer for the following observations taken on a staff held vertically at distance measured from the instrument. **7**

Observation	Horizontal Distance in 'm'	Vertical Angle	Staff intercept
1	50.0	+3º48'	0.50
2	100.0	+1º6'	1.00
3	150.0	+0º36'	1.50

b) Derive the expression for distance and elevation between staff and instrument station when line of sight is inclined upward and staff held was vertical at observation station in case of fixed hair method of techometric survey. **6**

3. a) Draw a figure showing all components of a combined circular curve and define the following terms- **6**

i) Point of intersection ii) Backward tangent
iii) Point of curve iv) Point of tangency
v) Long Chord vi) Point of combined curve

b) Two tangents intersect at chainage 800m, the deflection angle was 38º calculate all the necessary data for setting out a curve of radius 280m if it is intended to set the curve by deflection angle method. Take peg interval = 30m. **7**

OR

4. a) Derive the expression for first offset, second offset, third offset and last offset i.e. n^{th} offset from chords produced method and explain how would you set a circular curve by this method. **6**

b) A Reverse curve is to be set out between two parallel tangents 30m apart. The line Joining the two tangent points is 300m apart. The two arc of the curve have same radius. Calculate the necessary data to set the curve on the field by offset from Long chord at the interval of 20m. from common tangent point. **7**

5. a) A road bend which deflect 80º is to be designed for a maximum speed of 100km per hour, a maximum centrifugal ratio of 1/4, and maximum rate of change of acceleration of 30cm per sec^3, the curve consisting of a circular arc combined with two cubic spirals. Calculate: **7**

i) The radius of the circular arc,
ii) The requisite length of transition curve
iii) Total length of the composite curve

b) Define shift in case of transition curve accommodate in simple circular curve and hence prove that shift bisect transition curve and transition curve bisects the shift. **7**

OR

6. a) A transition curve is required for a circular curve of 250.0m radius. The gauge being 1,676m and maximum super elevation restricted to 0.150m. The transition is to be designed for a velocity such that no lateral pressure is imposed on rails and rate of gain of radial acceleration is $0.30m/sec^2/sec$. Calculate the required length of transition curve and design speed. **6**

b) Define the following- **4**

i) Point of compound curve ii) Reserve curve
iii) Spiral angle, iv) Deflection angle

c) What is transition curve and what are the functions of transition curve? **4**

7. a) The altitude of two proposed station A and B 130km apart are respectively 230m and 1200m. The altitude of the two point C and D on a profile between them are respectively 320m and 640m. The distance AC=50km and AD=90km. Determine whether A and B are intervisible and if necessary find the minimum height of scaffolding at B. Assuming A as the ground station such that new line of sight clears the peak by 2.5m. **8**

b) Discuss various triangulation figures and their respective suitability in view of shape of area covered. **5**

OR

8. a) From an eccentric station S. 12.25m to the west of main station B following angles were measured, agnle BSC= 76º25'32", angle CSA=54º32'20". The stations S and C are to the opposite side of line AB. Calculate the correct angle ABC, if length of AB and BC are 5200.0 and 4900.00m respectively. **6**

b) Define the following **4**

i) Phase of signal ii) Conditioned quantity
iii) Most probable value iv) Well condition triangle

c) What is the criteria for selection of triangulation station? **3**

9. a) Derive the expression to cover number of Photographs necessary for a rectangular area. **6**

b) A line AB measures 10.92cm on a photograph taken with a camera having a focal length of 20m. The same line measures 2.85cm. on a map drawn to a scale of 1:50000 calculate the flying height of aircraft if average elevation of the ground is 320m **7**

OR

10. a) What do you mean by relief displacement? Derive formula for relief displacement. **6**

b) Two points A and B having elevation of 650m. and 350m. respectively above datum appear on the vertical photograph having focal length of 20 and flying altitude of 2500m. Above datum. Their corrected photographic Co-ordinates are as follows. Determine the length of the ground line AB. **7**

Point	Photograph x cm	Co=ordinates Y cm
A	+2.65	+1.36
B	-1.92	+3.65

11. a) Differentiate between active and passive remote sensing systems. **6**

b) State and discuss the logical steps in global positioning system and Discuss the advantages and disadvantages of Global Positioning System. **8**

OR

12. a) Explain GIS and different objectives of GIS. **7**

b) Explain in brief about EDM? Write its types and uses. **7**

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B.E. (Civil Engineering) Sixth Semester (C.B.S.)

Fluid Mechanics-II

P. Pages : 2 **AHK/KW/19/2225**

Time : Three Hours * 1 0 5 6 * Max. Marks : 80

Notes : 1. Solve Question 1 OR Questions No. 2.
2. Solve Question 3 OR Questions No. 4.
3. Solve Question 5 OR Questions No. 6.
4. Solve Question 7 OR Questions No. 8.
5. Solve Question 9 OR Questions No. 10.
6. Solve Question 11 OR Questions No. 12.
7. Assume suitable data whenever necessary.
8. Illustrate your answers whenever necessary with the help of neat sketches.

1. a) Derive Hagen-Poiseuille equation and write the assumptions made on it. **6**

b) An oil with density $900\ N/m^3$ & viscosity $0.18\ N-s/m^2$ flows through a 10cm diameter horizontal pipe. The pressure drop over a 10m length of pipe is 10 kPa. Determine the average velocity and the rate of flow. **7**

OR

2. a) Write short notes on :- **6**
i) Coefficient of drag. ii) Coefficient of lift.

b) Derive the expression for shear stress distribution and velocity distribution for laminar flow in a circular pipe. **7**

3. a) Explain the term Hydrodynamically smooth and rough surfaces. **5**

b) Water at 20ºC is flowing steadily through a 5cm long pipe at a rate 2.5 lit/min. Find the shear stress on the internal wall of the pipe. Consider dynamic viscosity $0.001\ N-s/m^2$. **8**

OR

4. Three reservoir A, B and C with water surface elevations 40 m, 15 m and 10 m respectively and connected by three pipes by common Junction J. The pipe details are **13**

Pipe	Dia (mm)	Length (m)	Value of 'f'
A.J	550	850	0.021
BJ	400	450	0.022
CJ	350	1150	0.020

Estimate the discharge in each pipe and the value of the HGL at the junction J.

5. a) Derive Chezy's formula for flow through open channel and determine the dimensions of Chezy's constant C. **7**

b) A Rectangular channel cross section having base width of 2m & depth of flow 1.5m. Bed slope is 1 in 2000 is to be converted into most economical trapezoidal cross-section with side slope 1H : 1.5 v so as to carry same discharge with same bed slope. Determine dimensions of trapezoidal section. Take N = 0.016. **7**

OR

6. a) Differentiate between **any two.** **6**
i) Subcritical flow and supercritical flow. ii) Uniform & Non uniform flow.
iii) Specific energy and specific force.

b) Show that the Froude number at critical depth in a rectangular channel is unity. Also derive the expression for critical depth in a rectangular channel. **8**

7. a) Give the classification & characteristic of surface profiles for steep slope & critical slope. **6**

b) Derive the GVF equation and list the various assumptions made there in. **7**

OR

8. a) Derive the expression for loss of energy head in a hydraulic jump. **6**

b) Water flows in a rectangular channel 0.6m wide at a depth of 0.18m at a Froude number 2.75. **7**
Find
i) Height of Jump. ii) Sequent depth.
iii) Energy loss in Jump.

9. a) Explain Froude model law and Reynold's model law. **6**

b) What do you mean by similitude and what are the different types of similarities that must exist between a model and a prototype. **7**

OR

10. a) Write short notes on **any three.** **13**
i) Model analysis for partially submerged bodies.
ii) Distorted model.
iii) Derive model scales for velocity and time.
iv) Scale Ratio.

11. a) Draw a neat sketch of centrifugal pump & explain the function of each unit. **7**

b) A turbine with an overall efficiency of 90% is to be installed in a hydroelectric plant. The head & discharge available at the plant are 30 m & 15 m^3 / sec. respectively if the turbine has to run at 150 rpm. determine the power developed, specific speed and type of turbine. **7**

OR

12. Write short notes on **any three.**
i) Priming in centrifugal pump. **4½**
ii) Separation phenomenon in centrifugal pump. **4½**
iii) Indicator diagram for reciprocating pump. **5**
iv) Positive displacement pump. **4½**
v) Necessity of Air vessels. **4½**

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B.E. (Civil Engineering) Sixth Semester (C.B.S.)

Environmental Engineering-II

P. Pages : 2 **AHK/KW/19/2226**

Time : Three Hours * 1 0 5 7 * Max. Marks : 80

Notes :
1. All questions carry marks as indicated.
2. Solve Question 1 OR Questions No. 2.
3. Solve Question 3 OR Questions No. 4.
4. Solve Question 5 OR Questions No. 6.
5. Solve Question 7 OR Questions No. 8.
6. Solve Question 9 OR Questions No. 10.
7. Solve Question 11 OR Questions No. 12.
8. Due credit will be given to neatness and adequate dimensions.
9. Assume suitable data whenever necessary.
10. Illustrate your answers whenever necessary with the help of neat sketches.
11. Use of non programmable calculator is permitted.

1. a) Define Black water & Grey water and Explain the data required in planning of sewerage system. **7**

b) If the total area is 25 hectares & the intensity of rainfall is 50 mm/hr. Calculate coefficient runoff. Assume the population 8000 & rate of supply as 150 lpcd. Assume following data. **7**

Type of Area	% of Total Area	Runoff coefficient
Roofs & Pavement	30%	0.85
Lawns & Gardens	30%	0.15
Ground surfaces	40%	0.30

OR

2. a) Describe conservancy system & water carriage system of sanitation with their merits & demerits. **7**

b) Design a circular sewer running half full for the design discharge of 900 lps. Sewer running at a slope of 1 in 600. Assume n = 0.013 is Maning's formula. **7**

3. a) What is trap & explain various types of traps used in house plumbing system according to their shapes. **6**

b) Enlist the sewer appurtenances. Explain inverted syphon. **7**

OR

4. a) Discuss various stages involved in construction of sewers. **6**

b) Explain manhole with neat labelled diagram. **7**

5. a) Draw a flow sheet of sewage treatment plant & explain the function of each unit. **7**

b) 5 Day BOD at 20ºC of wastewater sample is 350 mg/l. determine its ultimate BOD & the 8 Day BOD at 30ºC assume BOD rate constant K at 20ºC = 0.23 / day. **7**

OR

6.	a)	Write a short note on physical & chemical characteristics of wastewater.	**7**
	b)	Design grit chamber for a flow of 12 mld.	**7**
7.	a)	What is activated sludge? Draw a neat sketch of activated sludge process & explain in detail.	**7**
	b)	What is mean by self-purification capacity of a stream? Explain it.	**6**

OR

8.	a)	Explain the different methods of disposal of sewage? Explain sewage forming.	**7**
	b)	Explain the various zones of pollution with neat diagram.	**6**
9.	a)	Draw a neat sketch of aqua privy and explain its working.	**6**
	b)	Design a suitable septic tank for a colony of 130 persons.	**7**

OR

10.	a)	Explain the terms. 1) Equalization. 2) Neutralization.	**6**
	b)	Write a short note on significance of Industrial wastewater treatment.	**7**
11.	a)	Classify sources of air pollution.	**6**
	b)	Discuss various meteorological parameters influencing air quality & pollutant dispersion.	**7**

OR

12.	a)	Write a short note on air pollution on human beings.	**6**
	b)	With neat sketch explain working of any one particulate control mechanism.	**7**

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