TE-sem-VI -CBSGS - Civil 21/11/17

GE-II

Q. P. Code: 13807

(3 Hours) Max Marks=80

Notes:

(a) Q. No. 1 is compulsory. Answer any 3 of the remaining questions.

(b) Assume suitable data, wherever necessary.

1. Answer any 4.

(a) Determine the factor of safety with respect to cohesion for a submerged embankment 20 m high and having a slope of 60^0. The properties of soil are $\varphi = 20^0$, $c = 40$ kN/m^2 and $\Upsilon_{sat} = 19$ kN/m^3. Taylor's stability number Sn = 0.097. 5

(b) Compare Rankine's theory of lateral earth pressure to Coulomb's theory of lateral earth pressure. 5

(c) Find the safe bearing capacity for a circular foundation of diameter 2.5 m rested at a depth of 2.0 m below the ground level in a soil having $c = 8$ kN/m^2 and $\Upsilon = 19$ kN/m^3 using Terzaghi's method. Take F.O.S. = 3, $N_c = 37.2$, $N_q = 22.5$ and $N_\Upsilon = 19.7$. 5

(d) What are the conditions where a pile foundation is more suitable than a shallow foundation? 5

(e) With the help of neat sketches, explain projection condition and ditch condition. 5

2. (a) A 10 m high cut has been made at an angle of 38^0 to the horizontal. A possible circular failure surface has a radius of 22 m and is passing through the toe of the cut slope and through a point 5 m away on the top ground from the edge of the cut. The weight of the failure mass is 1500 kN and its centre of gravity is at a distance 10 m from the centre of the failure circle. The properties of soil are $c = 40$ kN/m^2, $\varphi = 18^0$ and $\Upsilon = 20$ kN/m^3. Determine factor of safety that would be available on the said failure surface for the cut. Use friction circle method. 10

(b) Determine the active earth pressure on the retaining wall shown in Fig. 1. Take $\Upsilon_W = 10$ kN/m^3. 10

Turn Over

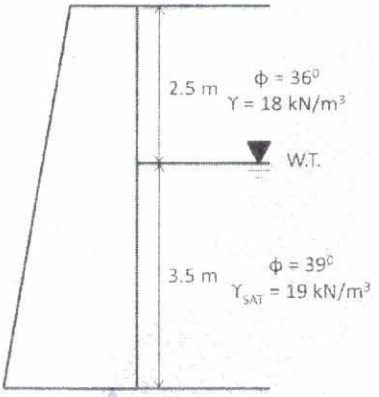

Fig. 1.

3. (a) With the help of neat sketch, explain Culmann's Graphical Method in detail. How can this method be extended to include the effect of uniform surcharge or live load applied to the backfill? 10

(b) Check the stability of the cantilever retaining wall shown in Fig. 2. The allowable bearing capacity of the soil is 500 kN/m^2. Other properties of the soil are as follows: $\phi = 36^0$, $\Upsilon = 18$ kN/m^3 and $\delta = 25^0$. 10

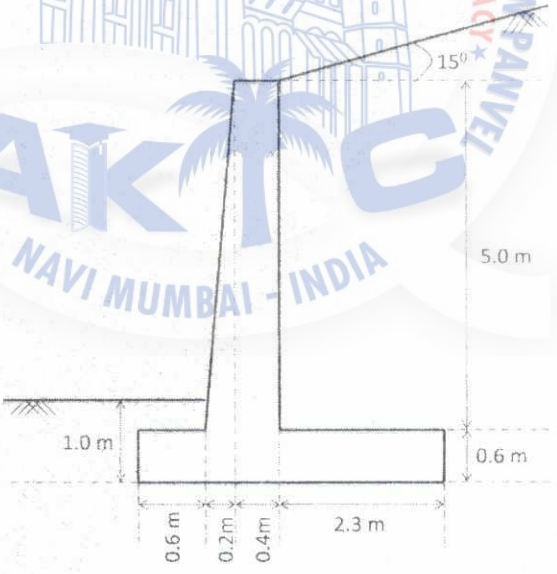

Fig. 2.

4. (a) A chimney with a rigid base 2.5 m square footing is placed at a depth of 1.2 m below the ground level. The soil is clay with c = 30 kN/m^2 and unit weight of 19.7 kN/m^3. The weight of the chimney is 100 kN and it has a resultant wind load of 25 kN acting at a height of 1.2 m above the ground level acting parallel to both of the sides. Determine the factor of safety with respect to bearing capacity using Vesic's theory. 08

(b) What are the limitations of plate load test? 06

(c) Explain in detail the effect of water table on ultimate bearing capacity of shallow foundations. 06

5. (a) A pile of 450 mm diameter and 10.5 m length is driven in a deposit having deposit having c = 0, $\phi = 30^0$, Υ = 16.5 kN/m^3 and Υ_{sat} = 18.5 kN/m^3. Considering critical depth to be 15 times the diameter of the pile, N_q = 35, k = 3.2 and $\delta = 20^0$, calculate the safe load that the pile can carry if the water table is located at a depth of 2.5 m from the ground level. Assume FOS = 2. 10

(b) An open cut 12 m deep is to be supported by 3 struts located at depths 1 m, 4 m and 9 m from the top of the cut in a soil whose profile from the top of the cut is as follows: 0 m to 2 m: c = 10 kN/m^2, Υ = 17 kN/m^3; 2 m to 5 m: c = 30 kN/m^2, Υ = 19 kN/m^3 and 5 m to 12 m: c = 50 kN/m^2, Υ = 20 kN/m^3. Find the forces in the struts if their centre to centre spacing along the length of the cut is 2.5 m. 10

6. (a) Write a short note on imperfect ditch conduit. 5

(b) What are the advantages of reinforced earth structures? 5

(c) With the help of a neat sketch, explain in detail the design considerations for mechanically stabilized earth structures. 10

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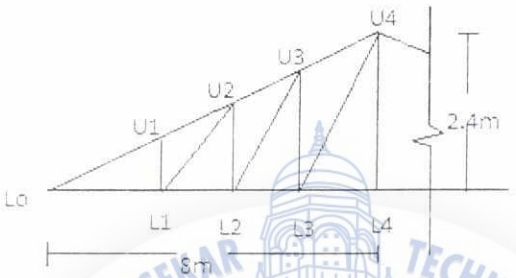
40 TE-Sem-VI - Avil-CBSGS - DDSS 22/11/17

Q. P. Code: 25406

Time: 4 Hours **Marks: 80**

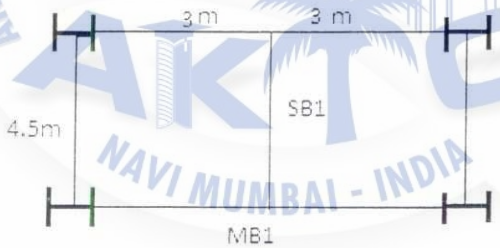
N.B.
1 Question No. 1 is compulsory attempt Three from remaining questions
2 Use of IS 800 and steel table is permitted
3 Assume data if required and justify same

Q.1 A truss as shown in fig. is used for an industrial shed situated in Pune. The truss is covered with GI sheet. Calculate panel point dead load, live load and wind load. Design the members LoL1, LoU1 and U1L1 and draw the design details Assume K1 =1, K2 =0.98,(Cpe - Cpi)= - 0.8 32



OR

The flooring system of an industrial shed is planned as shown in fig Design Beam SB1 And MB1 And a beam to beam connection between them with top flange of beam at same level . Use ISMB section to design beam assuming beam to be laterally supported throughout. For following data 32
Thickness of slab - 150mm
Thickness of wall 230mm
Height of parapet wall 1m
live load -2.1 kN/m^2
Unit weight of concrete and wall 25kN/m^3 and 20kN/m^3 resp.



Q.2 A Design a built up column 9m long to carry a factored axial compressive load of 1100kN. The column is restrained in position but not in direction at both ends. Design the column with connecting system as battens with bolted connection Use channels back to back .Use steel of grade Fe410 12

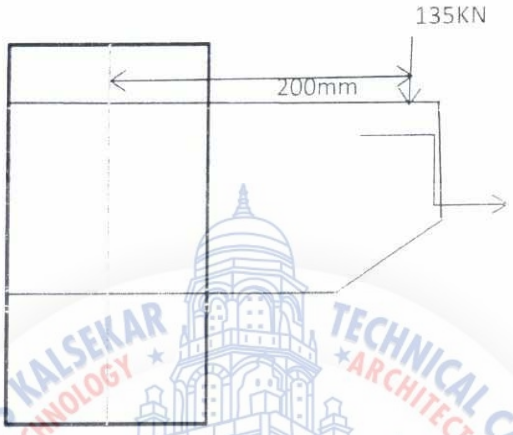
B Discuss various failure modes of compression member 4

Q.3 A A column ISHB 350 at 661.2 N/m subjected to a compressive factored load of 1800kN. Design suitable bolted gusseted base. The base rests on M15 grade concrete pedestal. Use 24mm diameter bolts of grade 4.6 for making the connection between gusset plate and column flanges. 12

B Explain 1)Shear Lag Effect 2) Block Shear Failure 4

Q.4 A Draw stress distribution diagram for plastic, compact ,semi compact and slender section 4

	B	Determine the design bending strength of ISLB 350 at 486 N/m considering the beam to beam a) Laterally supported b) Laterally unsupported. Design shear force V is less than the design shear strength. The unsupported length of the beam is 3.0m. Assume steel is grade Fe 415	12
Q.5	A	Design a bracket connection using 4.6 black bolt of suitable size to transmit a factored load of 135kN to the flange of a column ISHB225 The load eccentricity is 2oo mm measured from the column axis	10



	B	Explain web buckling and web crippling	6
Q.6		Design a welded plate girder 24 m in span and laterally restrained throughtout.It has to support a uniform load of 100kN/m throughout the span exclusive of self weight .Design the girder without intermediate transverse stiffeners. The steel for the flange and web plates is of grade Fe 410 Design the cross section ,the end load bearing stiffener and connections	16

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CIVIL / VI / AH-II 9/12/17

10

Q. P. Code: 27439

(3 hours)

Note: Max. Marks: 80

Question no.1 is compulsory
Solve any 3 questions out of remaining
Assume data wherever necessary and clearly mention the assumptions made.
Draw neat figures as required.

Q 1 **Answer any 4 of the following.** 20

a Write a short note on type of flow in open channel

b Explain 'S' curve in detail with neat sketches.

c Explain Momentum Thickness and Energy Thickness.

d Write a note on Boundary Layer Separation. State its control measures.

e Write a short note on Aerofoil.

Q 2 a Derive equation for Boundary Layer thickness, Local Coefficient of Drag for the given velocity profile : 10

$$\frac{u}{U} = 2\left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$$

b A cylinder whose axis is perpendicular to the stream of air having a velocity of 22 m/s, rotates at 310 r.p.m. The cylinder is 2 m in diameter and 10 m long. Find : (i) the circulation, (ii) theoretical lift force per unit length, (iii) position of stagnation points, and (iv) the actual lift, drag and direction of resultant force. Take density of air 1.24 kg/m^3. For actual drag and lift take $C_L = 3.4$, $C_D = 0.65$ and $ue/U = 1.57$. 10

Q 3 a A rectangular channel 5.5 m wide and 1.25 m deep has a slope of 1 in1000 and is lined with good rubble masonry for which Manning's n = 0.017. It is desired to increase the discharge to maximum by changing the channel slope or form of section. The dimensions of the section may be changed but the channel must contain the same amount of lining. Compute the new dimensions and probable increase in discharge. 10

b In a rectangular channel 3.5 m wide laid at a slope of 0.0036, uniform flow occurs at a depth of 2 m. find how high the hump be raised without causing afflux? If the upstream depth of flow is to raised to 2.5 m, what should be the height of the hump? take n=0.015

Q 4 a Design an irrigation channel by Lacey's theory for the following data 10
Full supply Discharge : 14 m^3/s
Silt Factor : 1.0
Side Slope : ½ : 1 (H:V)
N = 0.0225
Bed slope 1 in 5000

b Explain the Kennedy's theory in detail and write down the drawbacks in Kennedy's theory. 10

TURN OVER

Q5 a Derive dynamic equation for gradually varied flow for a rectangular channel. Also state assumptions made for the same 10

b Show that the head loss in a hydraulic jump formed in a rectangular channel may be expressed as 10

$$\Delta E = (V_1-V_2)^3/2g(V_1+V_2)$$

Q6 a The normal depth of water in a rectangular channel is 1.5 m wide, is 1 m. The bed slope of the channel is 0.0006 and N = 0.012. Find critical depth. At a certain section of the same channel the depth is 0.92 m while at a second section the depth is 0.86 m. Find distance between the two sections. Also find whether the section is located downstream or upstream w. r. to the first section. 10

b Derive the equation for most economical section of circular channel. 10

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(25) TE- Sem-VI - OBSGS- Civil -T.E-II 11/12/17

Q. P. Code: 27363

(3 HOURS) (MAX. MARKS:80)

1. Q.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

Q.No.1. (a) Classify the road as per modified Nagpur Road Plan. [5]

(b) What are the various requirements of an ideal highway alignment. [5]

(c) Explain Various Types of Parking. [5]

(d) Explain various test on Bitumen. Explain any one. [5]

Q.NO.2 (a) Calculate the safe stopping sight distance for design speed of 50 kmph for [7]

(i) two way traffic on a two lane road (ii) two way traffic on a single lane road.

(b) Derive the expression for extra widening of pavement on horizontal curves. [7]

(c) Explain various types of Rotary Intersection with neat sketches. [6]

Q.No.3. (a) The following data were obtained from spot speed studies carried out at a city road during a certain period of time. Suggest (i) Lower speed limit (ii) Upper speed limit (iii) Speed to check geometric design element. [10]

Speed Range kmph	0-5	5-10	10-15	15-20	20-25	25-30	30-35	35-40	40-50	50-60	60-70	>70
No. Of Vehicles	45	230	375	500	680	525	430	290	110	25	8	2

(b)Explain various types of Conflict. Draw the neat sketches ofvarious traffic signs. [10]

Q.No.4.(a)Explain the various steps involved in design of Rigid Pavement as perIRC:58:2011 [10]

(b) A two- lane two- way carriageway carries a traffic of 2500 cvpd. The rate of growth of traffic is 7.5% per annum. The design life is 15 years. The vehicle damage factor is 3. The CBR value of soil is 5%. Design the Flexible pavement and draw the neat sketch of cross section of flexible pavement. Refer Table No.1. [10]

TURN OVER

Q.No.5. (a) Explain typical flexible pavement failure with neat sketches. [10]

(b) Design size and spacing of dowel bar at the expansion joints a C.C. Pavement thickness 25 cm with radius of relative stiffness 80 cm, for a design load of 5000 kg. Assume load capacity of the dowel system as 40% of the design wheel load. Joint width is 2.0 cm, permissible shear stress and flexural stresses in dowel bar are 1000 kg/cm^2 and 1400 kg/cm^2 respectively and permissible bearing stress in C.C. is 100 kg/cm^2 [10]

Q.No.6 (a) Write short notes on pavement evaluation. [5]

(b) Explain Hill Roads. [5]

(c) Explain various types of bearing in bridges. [5]

(d) What are assumption for Economical span of bridge.

Table 1.

Cumulative Traffic (msa)	Total Pavement Thickness (mm)	PAVEMENT COMPOSITION		
		Bituminous Surfacing		Granular Base and Sub- base (mm)
		BC (mm)	DBM(mm)	
10	660	40	70	
20	680	40	100	Base= 250 mm
30	710	40	120	
50	730	40	140	Sub Base=300
100	750	50	150	
150	770	50	170	

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T.E- sem-VI - CBSGS - Civil - E.E-I 15/12/1

Q.P.Code: 26324

(Three Hours) **80 Marks**

N.B.

1. Question **No. 1** is **compulsory**.
2. Attempt any **three** question from remaining **five** question.
3. Assume any **suitable** data where ever required.
4. **Figures** to the **right** indicate **full** marks.

Q. 1 Solve the following.

a. What is the necessity of water supply schemes? **05**
b. Write Physical and chemical characteristics of water. **05**
c. Draw a diagram of rapid sand filter. **05**
d. Explain different sources of solid waste. **05**

Q.2 a. What are the various types of intake structure? Explain with sketches **10**
1. Reservoir intake
2. River intake

b. Explain water distribution networks with diagram. **10**

Q.3 a. Design 5 slow sand filter beds from the following data for the water works of a town of population 75000 **10**
Per capita demand = 135 lit/day/capita
Rate of filtration = 210 lit/hour/m^2
Assume maximum demand as 1.5 times the average demand. Out of five units, one is to be kept as stand by and used while repairing other units.

b. What do you mean by treatment of water? What are the objectives of treatment of water? Draw flow chart of a city water supply scheme with rapid sand filter. **10**

Q.4 a. Explain various population forecasting methods in brief. **10**
b. Write a note on taste & odour removal. **05**
c. Explain break point of chlorination. **05**

Q.5 a. Compare ion exchange and lime soda process of water softing. **05**
b. Explain principle of sedimentation. **05**
c. Define leachate. How leachate is formed and controlled in the landfill site? Explain with neat sketch. **10**

Q.6 Write short note on **(any four)**
a. Characteristics of Hazardous waste **05**
b. Water borne diseases **05**
c. Tube settler **05**
d. Fixtures & fitting of Building water supply **05**
e. Jar test **05**

TE-sem-VI - CBSGS - TRCPC-Qn | 21/12/17

Q. P. Code : 26286

[Time : 3 hours]

N.B.: MARKS: 80

1. **Q.1** is **compulsory**
2. Attempt any **three** question out of remaining **five**
3. Assume **suitable** data if **required**

Q.1 Write short notes on **20**

(A) Derive the expression for development length and explain anchorage bond

(B) Explain under reinforced, balanced and over reinforced rectangular section also draw strain and stress diagram for singly reinforced rectangular section.

(C) Draw stress-strain curve diagram for concrete and steel

(D) differentiate between pre-tensioning and post-tensioning

Q.2 (a) Find the moment of resistance of the R. C. C. beam of size 450 mm x 750 mm over all depth is reinforced with 8 bars of 20 mm diameter on tension side at effective cover of 35 mm. Use concrete grade as M25 and steel as Fe415. Also write what are the major defects of the Modular ratio method. **10**

(b) Determine the moment of resistance of the beam whose section is 300 x 600 mm and reinforced with 2 bars of 17 mm diameter tor steel at top and 6 bars of 20 mm dia. mild steel bars at bottom. Take effective cover as 50 mm for tension and compression steels. Use M15 grade of concrete. What superimposed load this beam can carry if its effective span is 8 m and is simply supported at its end. **10**

Q.3 (a) Determine the moment of resistance of the T-beam use following data: b_f = 1050 mm, D_f = 120 mm, b_w = 300 mm, cover = 50 mm, d = 450mm and A_{st} = 1900 mm^2 Use M 20 and Fe 415. **12**

(b) Design the shear reinforcement in a cantilever beam 250mm wide, 450mm effective depth carrying a u.d.l of 30 KN/m. The span of beam is 3.5m. The beam has main tension steel of 8 nos. Bar 12 mm dia Use M 20 /Fe 415. Value of permissible shear stress are given in table below. **08**

$100A_s/bd$	≤ 0.15	0.25	0.5	0.75	1.00	1.25	1.5	1.75
τ_{bd}	0.18	0.22	0.3	0.35	0.39	0.42	0.45	0.47

Q.4 (a) Design a one way cantilever slab having width of 230mm over a length of 3m. to support a live load of 3kN/m^2. Adopt M20 concrete and Fe 415 steel. 10

(b) A short column ofsquare section is to be designed to carry an axial load of 1025KN design the column, permissible stresses in concrete and steel are 5MPa and 130MPa respectively. 10

Q.5 Design a rectangular isolated sloped footing for a column of size 300 x 750 mm carrying an axial load of 1750 kN. The safe bearing capacity of the soil at the site is 200 kN/m2. The materials used are M15 and Fe415. 10

(b)A rectangular concrete beam of c/s 250mm×350mm is prestressed by means of 15 wires of 6mm diameter located 60mm from the bottom of the beam and 5 wires of dia. 8mm 50mm top. Assuming prestress in steel as 1000N/mm^2. Calculate the stresses at the extreme fibres of the mid span section, when the beam is supporting its own weight over a span of 5m and a u.d.l of 5KN/m is imposed. 10

Q.6 (a) A prestressed concrete beam of size 300mm * 500mm isprestressed with wires (area 320mm^2) located at a constant eccentricity of 50mm and carrying an initial stress of 1100N/mm^2. the span of beam is 9m. Calculate the percentage loss of stress in wires if (i) the beam is pretensioned (ii) the beam is post tensioned. Use the following data: Es = 210 KN/mm^2 and Ec= 35 KN/mm^2, relaxation of steel stress = 5% of initial stress, shrinkage of concrete = 300*10^{-6} for pretensioning and 200*10^{-6} for post-tensioning, Creep coefficient = 1.6, slip at anchorage= 1mm frictional co-efficient for wave effect = 0.0015/m 15

(b)Explain in detail pressure line theory in prestressed concrete 5

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