



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

Date: _____

School: SoET-CBSGS

Branch: CIVIL ENGG.

SEM: VI

To,
 Exam Controller,
 AIKTC, New Panvel,

Dear Sir/Madam,

Received with thanks the following [✓]Semester/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 | Geotechnical Engg.-II | CE-C601 | | ✓ | 02 |
| 2 | Design & Drawing Of Steel Structure | CE-C602 | | ✓ | 02 |
| 3 | Applied Hydrolics – II | CE-C603 | | ✓ | 02 |
| 4 | Transportation Engg. – II | CE-C604 | | ✓ | 02 |
| 5 | Environmental Engg. | CE-C605 | | ✓ | 02 |
| 6 | Theory & Reinforced Prestressed Concrete | CE-C606 | | ✓ | 02 |
| | | | | | |
| | | | | | |

Note: SC – Softcopy, HC - Harcopy

(Shaheen Ansari)
 Librarian, AIKTC

(3 Hours)

Marks : 80

- Note: 1. Question No. 1 is compulsory
 2. Attempt any 3 out of five questions
 3. Assume any suitable data where ever required
 4. Figures to the right indicate the full marks

- Q.1 a. Write the measures to avoid the failures of finite and infinite slope 05
 b. Write a short note on imperfect ditch conduit 05
 c. Explain the negative skin friction. 05
 d. A footing is resting on sandy soil, show it by calculation that if water table is going to rise upto ground surface, the bearing capacity reduces to 50%. 05
- Q.2 a. Explain the method of slices for computing factor of safety. Write the stepwise procedure supported by clear diagrams. 10
 b. Describe briefly Rebhann's graphical method for determining total active earth pressure. 07
 c. Write the limitations of dynamic methods for computation of pile capacity. 03
- Q.3 a. A retaining wall 6 m height retains cohesive soil with $c = 10 \text{ kN/m}^2$, $\phi = 10^\circ$, and $\gamma = 20 \text{ kN/m}^3$ upto a depth of 3 m from top. From 3 to 6 m the soil is the sandy with $\phi = 30^\circ$ and saturated unit weight of 24 kN/m^3 . The water table is at 3 m below ground level and uniform surcharge of 12 kN/m^2 acts on the top of soil. Draw the active earth pressure diagram detailing the values at the critical points. Also calculate the resultant thrust on the wall 10
 b. Derive the expression for factor of safety for an infinite slope made of cohesionless soil for the condition of seepage occurring parallel to slope. 05
 c. Explain the ditch and projection condition with diagram. 05
- Q.4 a. The detail of a sheet pile wall is given as below: 10
 The height of wall projecting above dredge level is 6 m and water table is at 2.5 m below top surface. The top surface is horizontal. Soil properties above water table are $\gamma = 18.5 \text{ kN/m}^3$, $\phi = 30^\circ$, below water table are : $\gamma_{sat} = 21.5 \text{ kN/m}^3$, $\phi = 30^\circ$, and below dredge level are : $\gamma_{sat} = 22 \text{ kN/m}^3$, $\phi = 0^\circ$, $c = 50 \text{ kN/m}^2$. Compute the depth of embedment.

- b. Find the forces in 3 struts located at depths 1 m, 2.5 m, and 4 m from the top of the cut for a bracing system provided to support an open cut of 5 m depth in a clayey soil. The properties of soil are $\gamma = 17 \text{ kN/m}^3$, $c = 22 \text{ kN/m}^2$, the centre to centre spacing along the length of the cut is 2.5 m. 10
- Q.5 a. Calculate the safe bearing capacity of a square footing $2 \text{ m} \times 2 \text{ m}$ in plan founded at a depth of 1.5 m below ground level. The unit weight of soil is 19 kN/m^3 and effective shear strength parameters are $c = 18 \text{ kN/m}^2$, $\phi = 30^\circ$. The natural water table is at a depth of 1.5 m below ground level. Use Vesic's method, the bearing capacity factors are given as $N_c = 30.1$, $N_q = 18.4$, $N_\gamma = 22.4$. Use factor of safety as 2.5. 10
- b. Write a note on critical depth of pile and adhesion factor. 05
- c. Explain how to improve the stability of slope using geogrid material. 05
- Q.6 a. A pile group of 16 piles of 550 mm diameter is arranged in square pattern with centre to centre spacing of 1.1 m. The piles are 10 m long and are embedded in soft clay soil with cohesion of 28 kN/m^2 . Take adhesion factor as 0.6. Determine the ultimate capacity of pile group. 10
- b. A strip footing is kept on ground surface and subjected a load of 200 kN/m . The value of factor of safety is 2. Determine the size of footing. Take $\gamma = 18 \text{ kN/m}^3$, $N_c = 22.5$, and $N_q = 19.7$. Use Terzaghi Analysis. 05
- c. Write a note on reinforcing elements. 05

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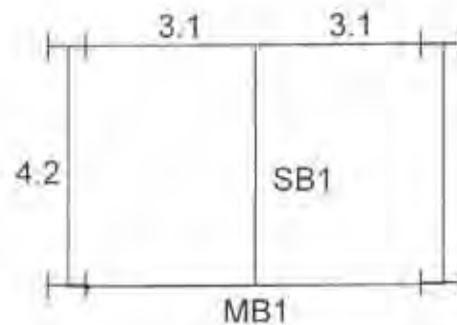
11/5/2019

16/5/19

- N.B.**
1. Question No. 01 is compulsory, attempt any three out of remaining three questions
 2. Draw neat and proportionate sketches whenever necessary.
 3. Use of IS 800 and steel table is permitted.
 4. Assume suitable data if necessary and justify the same.
 5. Use steel of Grade Fe410 and bolt of grade 4.6

Q.1 A flooring system is proposed for a small warehouse with size 6.2x4.2m as shown in fig. Design Beam SB1 and MB2, Also design a beam to beam connection between these two beam to transfer reaction of SB1 to MB2 assuming that all beams are laterally supported throughout and top flanges are at same level. 32

- All beam supports load of parapet wall of height-1.2m
- thickness of wall - 220 mm
- thickness of concrete slab - 180mm
- Unit weight - (Concrete-25 N/mm², Brick Wall - 19 N/mm²)

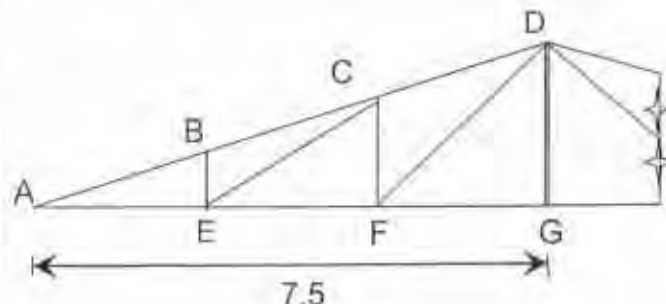


OR

Q.1 Design members AB, BC, AE, EF, BE and CF, considering structure to be installed in the vicinity of Mumbai. Find panel point load for given truss for DL, LL and WL and draw the same. 32

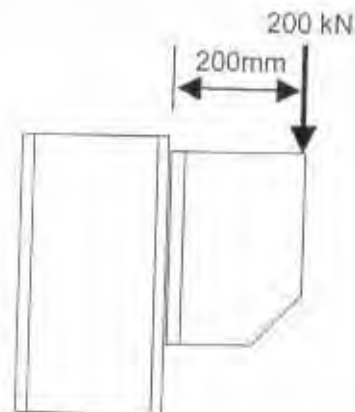
For the calculations of wind load consider,

- values of $K_1 = 1.0$, $K_2 = 0.98$, $K_3 = 1.0$ and $(C_{pe} - C_{pi}) = -0.5$,
- weight of AC sheets - 170 N/m²
- Self weight of Purlin - 250 N/m
- Spacing between trusses - 4m, Rise of truss - 1/5
- Span of truss - 15m



TURN OVER

- Q.2**
- a) Design a column with roller steel **single I-Section** to carry factored load of 800 kN, with effective length of 4.23m 04
- b) Design a **built-up column** of height 6 m with two channel section placed back to back to carry factored axial load of 1800 kN with one end fixed and other rolled. Design a column using single lacing system and draw neat diagram. 12
- Q.3**
- a) Write a note on web buckling and web crippling 04
- b) Design a **gusseted base** with bolted connection to carry load equal to design capacity of the column. The column is consist of ISHB 300@576.83 N/m with cover plate 300x20 mm on each flange. Determine size and thickness only for bolted gusset base assuming bearing pressure of concrete 10 N/mm². 12
- Q.4**
- a) Calculate design **bending strength (Ma)** for laterally unsupported beam ISLB 400@ 558.19 N/m for length 3.2m by using IS code table, also determine amount of UDL that can be carried by beam safely. 08
- b) **Design a bracket connection** to transfer end reaction of 200kN due to factored load. The load is acting at an eccentricity of 200mm from the flange of column. Design bolted joint connecting T-Flange with column flange. Provide 20mm diameter of bolt. 08



- Q.5**
- a) Design **welded plate girder** over a span of 20m to carry factored service UDL of 30kN/m excluding self-weight and a point load of 300 kN at mid-span. Design **plate girder** assuming $d/t_w = 120$, plate girder is laterally supported throughout and no intermediate stiffeners are provided. 16
- Design Cross Section, give check and draw neatly.
 - Connection between web and flange
 - Design end stiffeners

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7E-sem-VI - CBS45 - Civil

22/5/19

Paper / Subject Code: 36703 / APPLIED HYDRAULICS-II

Q.P. Code : 16409

(CBGS)

(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**
- a Explain specific energy and specific energy curve with a neat sketch.
 - b Classify and draw different surface profiles of a mild sloped open channel.
 - c Enlist the drawbacks of Kennedy's theory.
 - d Explain terminal velocity with suitable examples.
 - e Explain boundary layer separation with a neat sketch.
- Q2** a Prove that in a most economical trapezoidal channel section **10**
- (i) Half of the top width = one of the sloping sides.
 - (ii) The best side slope is 60° to the horizontal.
- b. The triangular channel where depth of flow is 0.6 m and conveys a discharge of $0.285 \text{ m}^3/\text{s}$ between elevations 300 m and 297 m. The channel is required to be the most economical one. For normal flow, what should be the length of the channel between these sections? Take $N = 0.021$. **10**
- Q3** a Derive an expression for the dynamic equation of gradually varied flow. State the assumptions. **10**
- b The loss of energy head in a hydraulic jump is 4.05 m. The Froude number just before the jump is 7.50. Find **10**
- (i) Discharge per meter width of channel.
 - (ii) The depth before and after hydraulic jump.
 - (iii) Froude number after jump.
 - (iv) Percentage loss of energy head due to the jump.
 - (v) Length of the jump.

- Q4 a Design a regime channel for a discharge of 50 cumecs with a silt factor 1 using Lacey's theory. 10
- b Compare Kennedy's and Lacey's theories. What are the drawbacks of Lacey's theory? 10
- Q5 a Water is flowing over a thin smooth plate of length 4 m and width 2 m at a velocity of 1.0 m/s. If the boundary layer flow changes from laminar to turbulent at a Reynold's number 5×10^5 , find (i) the distance from leading edge of the plate upto which boundary layer is laminar, (ii) the thickness of the boundary layer at the transition point and (iii) the drag force on one side of the plate. Take viscosity of water $\mu = 9.81 \times 10^{-4} \text{ Ns/m}^2$. 10
- b Derive Von-Karman Momentum Integral equation. 10
- Q6 a What is an airfoil? Explain airfoil terminologies with a neat sketch and prove that the co-efficient of lift on an airfoil is dependent on the angle of attack. 10
- b A kite 0.8m x 0.8m weighing 4.0 N assumes an angle of 12° to the horizontal. The string attached to the kite makes an angle of 45° to the horizontal. The pull on the string is 25 N, when the wind is flowing at a speed of 30 km/hour. Find the corresponding co-efficient of drag and lift. Density of air is given as 1.25 Kg/m^3 . 10

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TE - sem - VI - CBSGS - Civil

28/5/19

Paper / Subject Code: 36704 / TRANSPORTATION ENGINEERING - II

(3 Hours)

[Total Marks: 80]

- Note:**
- Q. No. 1 is compulsory
 - Attempt any 3 out of remaining 5
 - Support all theory and numerical with neat sketch

1. Solve any four (20 M)
- Explain various Road Patterns.
 - Explain Equivalent Single Wheel Load (ESWL)
 - What are the functions & requirements of joints?
 - Compare roundabout and rotary intersection
 - If number of load repetitions expected by 80 kN standard axle is 1000, 160 kN is 100 & 40 kN is 10000, find equivalent axle load.

2. A. Derive formula for Overtaking Sight Distance (OSD) and find OSD for NH with speed of 85kmph (08 M)
- B. Explain PCU & factors affecting Passenger Car Unit (PCU) (06 M)
- C. Explain various types of parking. (06 M)

3. A. The approximate cost of one pier and one superstructure span for various length are tabulated below. Derive formula for economical span and for data below. Determine economical span. (08 M)

| Span in Meter | Cost of 1 pier in Rs. | Cost of 1 superstructure |
|---------------|-----------------------|--------------------------|
| 10 | 25000 | 7000 |
| 15 | 28000 | 13815 |
| 20 | 32500 | 31000 |
| 25 | 33700 | 36000 |
| 30 | 34800 | 41400 |

- B. What are the types of signals used? (06 M)
- C. Calculate ruling & minimum radius if ruling design speed is 100 kmph & minimum design speed is 80 kmph (06 M)

4. A. Find Median & Modal Speed for the following data. Also determine the design speed. (08 M)
upper limit & lower limit speed for the following:

| Speed Range | Frequency (qi) |
|-------------|----------------|
| 0-5 | 0 |
| 5-10 | 3 |
| 10-15 | 8 |
| 15-20 | 13 |
| 20-25 | 19 |
| 25-30 | 16 |
| 30-35 | 11 |
| 35-40 | 9 |
| 40-45 | 2 |
| 45-50 | 0 |

- B. Explain the desirable properties of Aggregates used for Pavement. (06 M)
C. Explain various rigid pavement & flexible pavement failures. (06 M)
5. A. Explain Spot Speed Studies (Applications & Methods) (08 M)
B. What are the types of bearings? Give the purpose of providing Bearings. (06 M)
C. Determine characteristic deflection for the following readings taken on a road having traffic 1800 evpd. 1.426, 1.73, 1.40, 1.54, 1.32, 1.37, 1.66, 1.22, 1.94, 1.53. (06 M)
6. Write short note on any 4. (20 M)
A. Surface and Subsurface drainage
B. Compare Rigid Pavement & Flexible Pavement
C. Site selection of Bridge
D. Collision and condition diagram
E. Bitumen, Tar and Asphalt
F. Structural & functional evaluation of pavement

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TE - sem V - CRSGS - Civ

3/6/19

Paper / Subject Code: 36705 / ENVIRONMENTAL ENGINEERING-I

Q.P. Code : 26322

[3 Hours]

[Marks: 80]

- N.B:
1. Question No. 1 is compulsory.
 2. Figures to the right indicate full marks.
 3. Attempt any three from remaining five questions.
 4. Assume suitable data wherever required.

- (a) Explain the importance and necessity of planned water supplies schemes. 05

(b) Explain the requirements of good distribution systems. 05

(c) Explain the theory of sedimentation. 05

(d) Explain the various sources of MSW. 05
- (a) With the help of neat flow sheet, explain the treatment given to the river water for the drinking purpose. 10

(b) Enlist various population forecasting methods explain any one in detail. 5

(c) What is per capita demand? What are the factors which will affect the per capita demand. 5
- Write short notes on any four : 20

 - (a) Pressure filters
 - (b) Hazardous waste
 - (c) Fixtures & fittings
 - (d) De-fluoridation
 - (e) Water demand
- (a) The maximum daily demand at a water purification plant has been estimated as 10 million lit. Per day. Design the dimensions of a suitable sedimentation tank (fitted with mechanical sludge removal arrangements) for the raw supplies. Assume the suitable data required. 10

(b) Explain the comparison of slow sand and rapid gravity filters. 10
- (a) Design the dimensions of a set of rapid gravity filters for treating water required for a population of 50,000; the rate of supply being 180 lit/day/person. The filters are rated to work 5000 lit/hr/sq.m Assume suitable data if not given. 10

(b) Why disinfection is necessary? Explain the minor methods of disinfection. 10
- (a) What is Water Softening? What are the various methods of removal of permanent hardness? Explain any one in detail. 10

(b) Why it is necessary to remove iron from water if exceeds permissible limits. What technique you will adopt to remove excess iron? 5

(c) What is intake structure? Explain in brief factors governing the location of an intake. 5

- N. B.
1. Question No.1 is compulsory
 2. Answer any three questions out of remaining
 3. Assume any data, if required and state them clearly.
 4. Attempt sub questions in order.
 5. Illustrate answer with neat sketches wherever required.
 6. Figure to the right indicates full marks.

1. Attempt Any Four.

- a. Explain the provisions of torsional reinforcing bars in restrained type of two way slabs. **05**
- b. Write down the steps for solving the design type of problems of singly and doubly reinforced rectangular beams. **05**
- c. Explain the behaviour of slender columns under axial load and uniaxial bending, bent in single curvature. **05**
- d. Explain the one-way and two-way shears of foundation slabs. **05**
- e. Establish the equations for determining the depth of neutral axis, moment of resistance and area of tension steel of an under-reinforced rectangular beam. **05**

2.

- a. Design a doubly reinforced beam to carry a superimposed load of 60kN-m run. The overall depth and width of the beam are restricted to 840mm and 300mm respectively. The beam has a clear span of 5m and a bearing of 50cm on each end. Use M20 and Fe415. **10**
- b. Design a R.C.C. slab for a room 8m X 6m measuring from inside. The slab is simply supported on a 400mm thick wall. The superimposed load acting on slab is 4kN/m² and floor finish is 1kN/m² rick. All corners are free to lift. Use M20 concrete and Fe415 steel. **10**

| | | | | | | | | | | |
|------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 1 | 1.1 | 1.2 | 1.3 | 1.4 | 1.5 | 1.75 | 2 | 2.5 | 3 |
| α_e | 0.062 | 0.074 | 0.084 | 0.093 | 0.099 | 0.104 | 0.113 | 0.118 | 0.122 | 0.124 |
| α_s | 0.062 | 0.061 | 0.059 | 0.055 | 0.051 | 0.046 | 0.037 | 0.029 | 0.020 | 0.011 |

3.

- a. Design a cycle stand shade consists of a R.C. slab which cantilevers 3.5m on each side of central R.C. beam and is monolithic with it. The R.C. beam is simply supported on columns 375mm wide, at the ends, over a clear span of 7m. Design the shade for superimposed load of 3000N/m². Use M20 concrete and Fe415 steel. **10**
- b. A square column 400mm side carries an axial load of 1050kN. Design the column and a square footing of the column. The safe bearing capacity of the soil at the site is 200kN/m². Use M20 concrete and Fe 415 steel. **10**

4.

- a. A prestressed beam of section 130mm wide by 400mm deep is used over an effective span of 8m to support a uniformly distributed load of 3.5kN/m, which includes the self weight of the beam. The beam is prestressed by a straight cable carrying a force of 180kN and located at an eccentricity of 50mm. Determine the location of the thrust line in the beam and plot its position at quarter and central span sections. **10**
- b. Design a T-beam to the following data : clear span=9.50m, bearing at each support =400mm, live load on beam =4kN/m², spacing of beams=3m c/c, thickness of slab =150mm ; M20 concrete and Fe415 steel. **10**

TURN OVER

- 5.
- a. The initial prestressing force transmitted by a cable to a prestressed concrete beam is 390kN. The sectional area of the prestressing wires is 325mm². Find the percentage loss of stress in the wires due to shrinkage of concrete only.
 - i. If the beam is post tensioned 10
 - ii. If the beam is pre tensioned 06
 - b. Explain in detail various systems of prestressing. 04
 - c. Write a short note on load balancing method. 04
- 6.
- a. Design a circular column to carry an axial load of 5kN. The diameter of column is limited to 600mm. Use spiral reinforcement. Use M20 concrete and Fe415 steel. 10
 - b. Explain the advantages of prestressing over reinforced concrete. 05
 - c. Write a detailed note on "losses in prestressing" 05