ANJUMAN-I-ISLAM'S

AKTC KALSEKAR TECHNICAL CAMPUS

INNOVATIVE TEACHING · EXUBERANT LEARNING

Knowledge Resource & Relay Centre (KRRC)

AIKTC/KRRC/SoET/ACKN/QUES/2017-18/

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 SC	Format HC	No. of Copies
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 - Hardcopy

(Shaheen Ansari)
Librarian, AIKTC

T·E - Sem -VI- CBSGS- Civil

16/11/18

(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.**   An infinite slope of 28^0 of cohesionless soil is in submerged condition. The angle of   5
shearing resistance of soil is $33°$. Check the stability of slope.

B.   Differentiate between Rankine's and Coulomb theory for earth pressure theory.   5

C.   Write the factors affecting the bearing capacity of soil.   5

D.   Explain the type of piles based on mechanism of load transfer.   5

Q.2.   **A.**   A 5 m deep canal has side slope of 1 : 1. The properties of soil are $c = 20$ kN/m^2, $\phi_u =$ 10
$10°$, e = 0.8 and G = 2.8. If the Taylor's stability number is 0.108, determine the factor
of safety with respect to cohesion when the canal runs full. Also find the same in case
of sudden drawdown, if Taylor's stability number for this condition is 0.137.

B.   A retaining wall 5 m high, retains a soil with $c = 24$ kN/m^2, $\phi = 28^0$, $\gamma = 19$ kN/m^3 with   7
horizontal surface level with the top of wall. Compute the total active and passive earth
resistance on the wall and their point of application.

C.   Write the assumptions made by Coulomb in developing earth pressure theory.   3

Q.3.   **A.**   A strip footing is to be designed for a given total load of 250 kN per m. Determine the   12
width of strip footing by taking a factor of safety of 3 and use Terzaghi' bearing
capacity equation. Take $\gamma = 19$ kN/m^3, $\phi' = 35^0$, $c' = 5$ kN/m^2. The depth of foundation
is 1 meter. Bearing capacity factors are given as: $N_c = 46$, $N_q = 33$, $N_\gamma = 48$.

B.   Write the use and limitations of the plate load test.   8

Q.4.   **A.**   The details of a cantilever retaining wall are given as below: 10

Stem: 0.35 m width and 5.4 m height from top to bottom of base slab.

Heel slab: 2.5 m length and 0.35 m depth

Toe slab: 1.25 m length and 0.35 m depth.

Earth fill is retained above heel slab and ground surface on top is horizontal. Calculate
the maximum and minimum pressures under the base if the water table rises behind the
wall to the level 3.1 m from the top of wall. The shear strength parameters of soil are
$C= 0$, $\phi = 32^0$ $\gamma_{sat} = 18$ kN/m^3. Unit weight of concrete is 23 kN/m^3 if wall friction is
taken as two third of ϕ value on the base of wall, check the stability of all for all
conditions

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B.   Write the formulae for water table correction for computation of bearing capacity.   5

C.   Write procedure how to compute the struts load in an open cut.   5

Q. 5   A.   A square group of 9 piles was driven into soft clay extending to a large depth. The   10
diameter and length of the piles were 300 mm and 9 m respectively. If undrained
cohesion is 45 kN/m² and the pile spacing is 1 m centre to centre. What is the capacity
of group? Take factor of safety of 2 and adhesion factor as 0.7.

B.   Write the formula for negative projecting conduit and explain its use in design of   5
conduits with meaning of all parameters.

C.   Explain the advantages of reinforced soil.   5

Q. 6   A.   A retaining wall, 3 m high supports a dry cohesionless backfill with a plane ground   10
surface sloping upwards at a surcharge angle of 10° from top of the wall. The back of
the wall is inclined to the vertical at a positive batter angle of 8°. The unit weight of soil
is 19.6 kN/m³ and ϕ = 29°. Assuming an angle of wall friction of 11°, determine the
total active force by Rebhann's Method.

B.   In a failed soil slope of soft clay, the failure surface is circular and the centre of rotation   5
is known. The driving moment is computed to be 2800 kN-m and the resisting moment
is computed to be 2450 kN-m. It is proposed to reconstruct the slope using several
layers of geogrids having allowable tensile force of 20 kN/m. The average centroid of
the reinforcement is anticipated to be 8 m away (vertically) from the centre of rotation.
Compute the required number of layers of the reinforcement, if the desire factor of
safety is 1.5.

C.   Explain the types of conduits.   5

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(4 Hr)   **Maximum Marks - 80**

N.B.   1.   Question **No.01 is compulsory**, attempt any **three** out of remaining questions
2.   Draw neat and proportionate **sketches** whenever necessary.
3.   Use of **IS 800:2007 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   Design **Beam B1 and B2** using ISMB section and **beam to beam**   **32**
connection, assuming top flange of beam embedded in slab. The
flooring plan is as shown, Design flooring system for following data,
provide cover plates to Beam B2 if Necessary
-   Thickness of Slab - 15cm
-   Thickness of wall - 230mm
-   Height of wall over all beams - 1.3m
-   Unit weight - (Concrete-25 N/mm^3 , Brick Wall - 20 N/mm^3)
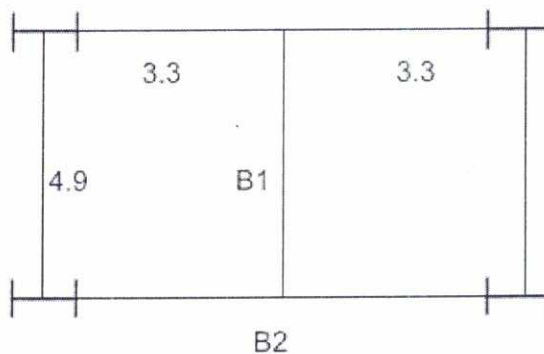
OR

Q.1   Find panel point load for given roof truss for DL,LL and WL and design   **32**
member AB,AL and BL. the structure is situated in Mumbai industrial
area with rise ⅓.
-Spacing between trusses - 3m,
-Span of truss - 13.2m
-Self weight of Purlin - 220 N/m
-wt of GI sheets - 150 N/m^2
The values of K_1 = 1.0, K_2 = 0.98, K_3 = 1.0 and $(C_{pe} - C_{pi})$ = -0.3,
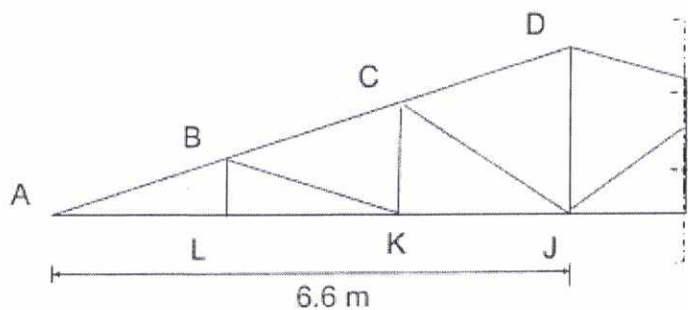
Turn over

Q.2 a) Design a **built-up column** with two channel sections which are placed   **10** face to face to support factored axial compressive load of 1700 kN, If the effective length of column is 6.2 m, Design appropriate section, spacing between channel and suitable bolted lacing system for d=20mm.

b) **Design a column** using ISHB Section. Column is of length 4.2m supports   **06** factored load of 700kN, the column is effectively held in position and direction at both the ends.

Q.3 a) A Column ISHB 300@576.83 N/m strengthened with two cover plates of   **10** size 350 x 20mm to carry factored axial load of 2000kN, calculate Size, Thickness and number of bolts required for the **Gusset base** assuming M20 concrete grade and 24mm bolt diameter, draw diagrams showing all details.

b) A column is Consisting of ISHB 300@576.83 N/m carries axial factored   **06** load of 800kN, Design **a Square and Rectangular slab base** considering M15 concrete grade . Comment which one is economical.

Q.4 a) A column of ISHB 150 @ 300N/m carries factored end reaction of 400kN   **08** due to a Beam. **Design bolted bracket connection** with an eccentricity of 175 mm from web of column, the thickness of bracket plate is 12mm, and diameter of bolts is 24mm.
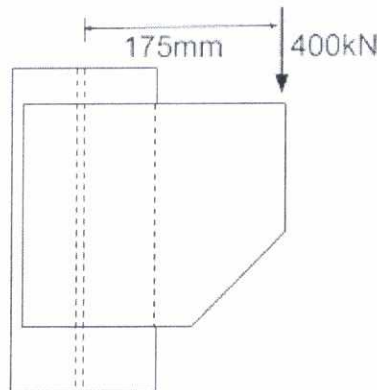
Q.5 b) A ISLB 350 @486 N/m used to design a laterally unsupported beam with   **08** length of 3.0m, Determine design bending strength (M_d) by using IS code table, also determine **safe UDL** that can be applied over beam.

a) A simply supported **welded plate Girder** of span 26m is subjected to   **16** UDL of 50 kN/m over the span excluding self weight, Design cross section, give check for shear buckling and design bending strength, also provide 2-step curtailment assuming plate girder is laterally supported throughout and no intermediate stiffeners are provided. (No need to design welded connections and stiffeners)

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Paper / Subject Code: 36703 / APPLIED HYDRAULICS-II

Q. P. Code: 27438

(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 Write a short note on back water curve and afflux.
b Classify and draw different surface profiles of a steep sloped open channel.
c Enlist the advantages of Lacey's theory over 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 60^0 to the horizontal.

b. The triangular channel where depth of flow is 0.6 m and conveys a discharge of 0.285 10
m^3/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.

Q3 a Derive an expression for the dynamic equation of gradually varied flow. State the 10
assumptions.

b The loss of energy head in a hydraulic jump is 4.05 m. The Froude number just before 10
the jump is 7.50. Find
    (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.

P.T.O

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Q4 a Design a regime channel for a discharge of 50 cumecs with a silt factor 1 using Lacey's 10
theory.

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 10
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 $\mu = 9.81 \times 10^{-4}$ Ns/m^2.

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 10
co-efficient of lift on an airfoil is dependent on the angle of attack.

b A kite 0.8m x 0.8m weighing 4.0 N assumes an angle of 12° to the horizontal. The 10
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.

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Paper / Subject Code: 36704 / TRANSPORTATION ENGINEERING - II

(3 Hours)   [Total Marks: 80

N. B.   i. Q. No. 1 is **compulsory**
        ii. Attempt **any 3** out of **remaining 5**
       iii. Support all **theory and numerical** with **neat sketch**

1   **Solve any four.**   **(20 M)**
     A.   Draw cross section of rigid pavement and explain the function of each layer
     B.   Explain AADT and ADT.
     C.   Explain types of highway maintenance
     D.   Discuss on surveys for highway alignment
     E.   Explain various types of gradients.

2   **A.**   Write note on   **(08 M)**
          i.   Modulus of subgrade reaction
         ii.   ESWL
   B.   Discuss on Mandatory signs   **(06 M)**
   C.   A bridge is proposed above a river having discharge of 250 m³/sec, Lacey's Silt factor is   **(06 M)**
       1.00 find the scour depth when: a) 4 span of 20 m each and b) 3Span of 20 m each is used.

3   **A.**   Derive formula for Stopping Sight Distance. Also calculate SSD for 1way road having   **(08 M)**
       design speed of 80 kmph. Reaction time is 2.5 sec
   B.   What is VDF? Give its value for different road widths.   **(06 M)**
   C.   What are the assumptions for economical span? Write steps for calculating economical   **(06 M)**
       span

4   **A.**   Compare the following   **(09 M)**
          i.   Running and Journey speed
         ii.   On-street and off-street parking
        iii.   At-grade and grade separated intersections
   B.   Explain the following: **(06 M)**
          i.   Seal coat and tack coat
         ii.   Subgrade
        iii.   Tyre pressure
   C.   What is Camber? Explain its types.   **(05 M)**

5   **A.**   Find out the warping stress of 25 cm thick CC pavement with transverse joint at 5 m &   **(10 M)**
       longitudinal joint at 3.6 m interval. Take k = 6.9 kg/cm³, a = 15 cm, temperature difference
       is 0.6°C /cm slab thickness in day, temperature difference is 0.4°C /cm slab thickness in
       night. Take E = 3 x 10⁵ kg/cm², e = 10 x 10⁻⁶/°C, l = 87.2 cm.
   B.   What is the objective of providing drainage?   **(05 M)**
   C.   Explain various types of bearings.   **(05 M)**

6   **A.**   Write a detail note on Benkelman beam   **(10 M)**
   B.   Explain 30th HHV   **(05 M)**
   C.   Explain penetration test on bitumen   **(05 M)**

Paper / Subject Code: 36705 / ENVIRONMENTAL ENGINEERING-I

QP Code:16959

(3 Hours)   [Total Marks: 80]

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

Q.1 Attempt any **four**

    a. Mention the factors that influence per capita demand.   05

    b. Give the maximum acceptable limits of the following for the public drinking   05
water: i)Hardness ii)Turbidity iii)Fluorides iv)Nitrates v)Iron

    c. Compare the merits and demerits of the 'continuous 'and 'intermittent'   05
systems of water supply.

    d. Determine the quantity of alum required in order to treat 15million litres of   05
water per day at a treatment plant.

    e. Write down characteristics of hazardous wastes.   05

Q.2 **a.** Explain the Hardy Cross Method used for pipe network analysis in water   10
distribution system.

    b. Design the dimensions of a set of rapid sand filters for treating water required   10
for a population of 50,000, the rate of supply being 180 lit/day. The filters are
rated to work 4000 lit per hour per square meter. Also Design under drainage
system and wash water troughs. Assume whatever data are necessary.

Q.3 **a.** What is Leachate? How it is formed? How its movement is controlled?   10

    b. What is meant by 'disinfection'? What is its importance? Explain in detail   10
different methods of Disinfection.

Q.4 **a.** Enumerate and discuss in brief the various physical, chemical and biological   10
characteristics of testing of raw water supplies.

    b. Three million litres of water per day is passing through a sedimentation tank   10
which is 6m wide, 14m long and having a water depth of 3m.
      a) Find the detention time for the tank? b) What is the average flow
      velocity through the tank? c) Compute the overflow rate.

Q.5 **a.** Explain with the flow diagram the various methods which are adopted   10
collectively for treating public water supplies.

    b. Discuss any two types of water piping systems that may be employed in   10
buildings, giving merits and demerits of each system.

Q.6 Write short note on(**any four**)   20
    a. Geometric Increase method of population forecasting
    b. Zeolite process
    c. Jar Test
    d. Sources of solid waste
    e. Reverse Osmosis
    f. Water Meters

(3 Hours)   (Total Marks : 80)

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.   What do you mean by balanced rectangular beam? Establish the equations for determining the moment of resistance and percentage of tension steel in a balanced rectangular beam.   **05**
   b.   Write a short note on "modes of failure in case of columns".   **05**
   c.   Explain the structural benefits of flanged beam and doubly reinforced beam.   **05**
   d.   When do we go for doubly-reinforced beams? Establish the equation for determining areas of steel for the doubly reinforced rectangular beams.   **05**
   e.   State span to depth ratios of two-way slabs for different support conditions to be considered for the control of deflection.   **05**

2.

   a.   A doubly reinforced beam is 400mm wide and 600mm deep to the centre of tensile reinforcement. The compression reinforcement consists of 4 bars of 16mm diameter, and is placed with its centre at a depth of 40mm from the top. The tensile reinforcement consists of 4 bars of 20mm diameter. The section is subjected to a bending moment of 100kN-m. Determine the stresses in concrete and steel. Take m=11.   **10**

   b.   Design a cycle stand shade consists of a R.C. slab which cantilevers 3m on each side of central R.C. beam and is monolithic with it. The R.C. beam is simply supported on columns 400mm wide, at the ends, over a clear span of 6m. Design the shade for superimposed load of 2000N/m². Use M20 concrete and Fe415 steel.   **10**

3.

   a.   Design and detail a slab over a room 6.5m X 8m. The slab is supported on a wall all around with adequate restraint and the corners are held down. The live load on the slab is 3000N/m². This slab has a bearing of 125 mm on the supporting walls. Use M25 concrete and Fe415 steel.   **08**

L_y/l_x	1	1.1	1.2	1.3	1.4	1.5	1.75	2	2.5	3
α_x	0.062	0.074	0.084	0.093	0.099	0.104	0.113	0.118	0.122	0.124
α_y	0.062	0.061	0.059	0.055	0.051	0.046	0.037	0.029	0.020	0.014

   b.   An isolated T- beam, simply supported over a span of 6m has following dimensions : width of flange 750mm, thickness of flange 125mm, overall depth of beam 400mm, width of web 260mm, effective cover of tensile reinforcement 40mm. The beam is reinforced with 4 bars of 20mm dia. Determine the moment of resistance of the beam if
   i.   Mild steel bars are used
   ii.   Fe 415steel bars are used
            m=19in each case.   **12**

4.

a.   A rectangular column 600mm X 400mm carries a load of 800kN. Design a rectangular footing to support the column. The safe bearing capacity of the soil is 200kN/m². Use M20 concrete and Fe 415 steel.

b.   A post tension concrete beam of 30m span is subjected to a transfer prestress force of 2500kN at 28 days strength. The profile of the cable is parabolic with maximum eccentricity of 200mm at mid span. Determine the loss of prestress and the jacking force required if jacking is done from both ends of the

beam. The beam has a cross section of 500mmX 800mm, and is prestressed with 9 cables, each cable consisting 12 wires of 5mm diameter. Take $E=2.1X10^5 N/mm^2$ and $Ec=3.5X10^4 N/mm^2$.

5.

    a. A simply supported prestressed concrete beam of rectangular cross section 400mmX 600mm, is loaded with a total uniformly distributed load of 256 kN over a span of 6m. Sketch the distribution of stresses at mid-span and end section if the prestressing force is 1920 kN and the tendon is..

        i.   Concentric

        ii.   Eccentric located at 200mm above the bottom fibre.   **10**

    b. Differentiate pre-tensioning and post-tensioning prestressing systems.   **05**

    c. What are the three different ways to provide shear reinforcement? Explain the method of design of each of them.   **05**

6.

    a. The section of a singly reinforced concrete beam is subjected to a sagging bending moment of 2000 N-m. If the stresses in the concrete and steel are not to exceed $7N/mm^2$ and $230 N/mm^2$ respectively, find the dimensions of the beam. The width of the beam may be made 2/3 the effective depth. Take m=13,33 find also area of steel.   **10**

    b. Design a circular column to carry an axial load of 500kN. The diameter of column is limited to 500mm. Use spiral reinforcement. Use M20 concrete and Fe415 Steel.   **10**

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