Hall Ticket No : **Question Paper Code :**

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)
III/IV B. Tech I- Semester Regular Examinations Nov - 2017
ENVIRONMENTAL ENGINEERING-II
(CIVIL)

Time: 3 hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT-I

1. a) Write about the classification of sewerage systems and state under which conditions each is preferred. **(6M)**

b) Explain in detail the various factors affecting the sanitary sewage **(6M)**

(OR)

2. a) What is meant by water - carriage system? List out its merits and demerits. . **(6M)**

b) Design a sewer which receives combined sewage at the rate of 800 lit/sec. the sewer runs half full. Assume the value of coefficient of rugosity as 0.013 and bed slope of 1 in 100. **(6M)**

UNIT-II

3. a) Derive the mathematical equation for first stage BOD. **(6M)**

b) Explain different constituents of sewage along with its physical characteristics **(6M)**

(OR)

4. a) Explain the physical, chemical and biological characteristics of sewage. **(6M)**

b) Explain in detail the procedure for sampling of sewage. (**6M**)

UNIT-III

5. a) What is grit chamber? Explain its working with a neat sketch. **(6M)**

   b) Write short notes on primary and pre treatment units. **(6M)**

(OR)

6. a) Explain with neat sketch, operation of skimming tanks **(6M)**

   b) Explain in detail the treatments to be conducted on the sewage **(6M)**

UNIT-IV

7. a) Distinguish between aerobic and anaerobic processes. **(6M)**

   b) Draw a neat sketch of trickling filter and explain the functioning of it. **(6M)**

(OR)

8. a) Explain in detail about oxidation ditch with neat sketches. **(6M)**

   b) Explain the principles and operation of activated sludge process. **(6M)**

UNIT-V

9. a) Compare the septic tanks and imhoff tanks (**6M)**
   b) Explain the different methods of sludge disposal **(6M)**

(OR)

10. a) Explain with a neat sketch the working of sludge digestion tanks. **(6M)**

    b) Explain the various methods of sludge treatment. **(6M)**

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Hall Ticket No: **Question Paper Code :**

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES

(AUTONOMOUS)

III/IV B. Tech I- Semester Regular Examinations November – 2017

Fluid Mechanics-II

(CIVIL)

Time: 3 hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered at one place only

Unit - I

1 (a) Derive an expression for drag force on a smooth sphere of diameter of D moving with a Uniform velocity V in a fluid of density ρ having Dynamic viscosity μ using Rayleigh's Method **(6M)**

(b) Explain Boundary Layer separation with a neat sketch. **(6M)**

(OR)

2. (a) Explain different model laws used in Dimensional Analysis along with examples **(6M)**

(b) Air flows over a flat 1m long at a velocity of 6 m/s. Determine
(a) The boundary layer thickness at the end of the plate
(b) Shear stress at the middle of the plate
(c) The total drag per unit length on the sides of the plate

Take density of air ρ = 1.226 kg/m^3 and kinematic viscosity υ = 0.15 x 10^{-4} m^2/s **(6M)**

Unit – II

3. (a) Derive an expression for force exerted by jet and work done by the jet on a moving Vertical flat plate with a neat sketch. **(6M)**

(b)A kite weighing 12.26 N has an effective area of 0.9 m^2. The tension in the kite string is 32.37 N when the string makes an angle of 45° with the horizontal. For a wind of 32 km/hr, what are the coefficients of lift and drag if the kite assumes an angle of 8° with the horizontal. Take specific gravity of air as 11.801 kg/m^3. **(6M)**

(OR)

4. (a) Explain different types of Drag and Magnus effect with neat sketches **(6M)**

(b) A jet of water of Diameter 7.5cm strikes a curved plate at its centre with a velocity of 20 m/s. The curved plate is moving with a velocity of 8 m/s in the direction of the jet. The jet is deflected through an angle of 165°. Assume the plate is smooth find
(a) Force exerted on the plate in the direction of the jet
(b) Power of the jet
(c) Efficiency of the jet **(6M)**

Unit – III

5. (a) Explain (1)cavitation, (2)Impulse Turbine and(3) Draft tube provide examples where ever necessary. **(6M)**

. (b) A pelton wheel has a mean bucket speed of 12 m/s and is supplied with water at a rate of 750 litres per second under a head of 35 m. If the bucket deflects the jet through an angle of 160^{O}, find the power developed by the turbine and its hydraulic efficiency. Take the coefficient of velocity as 0.98. Neglect friction in the bucket. Also determine the overall efficiency of the turbine if its mechanical efficiency is 80% **(6M)**

(OR)

6.(a) Define Hydraulic efficiency, Mechanical efficiency, Volumetric efficiency, and overall Efficiency **(6M)**

(b) A Pelton wheel developes 5520 kW under a head of 240m at an overall efficiency of 80% when revolving at a speed of 200 r.p.m. Find the unit discharge, unit power and Unit speed **(6M)**

Unit – IV

7. (a) Define Net positive suction head ,specific speed of centrifugal pump and operating characteristic curves **(4M)**

(b) Determine the maximum speed at which a double acting reciprocating pump can be operated under the following conditions (1) no air vessel on the suction side (2) a very large air vessel on the suction side close to the pump. The suction lift is 4m, length of the suction pipe is 6.5m, diameter of suction pipe is 100mm, diameter of piston is 150mm and length of stroke is 0.45m.Assume simple harmonic motion, atmospheric head as 10.3m of water and separation occurs at 2.6m of water absolute. Take Darcy's f = 0.024 **(8M)**

(OR)

8. (a) Find the power required to drive a centrifugal pump which delivers 40liters of water per second to height of 20m through a 150mm diameter and 100 mm long pipeline. The overall efficiency of pump is 70% and Darcy's f= 0.06 for the pipeline. Assume the suction pipe inlet losses is equal to 0.33 m **(6M)**

(b) Explain (1) Types of reciprocating pumps (2) Slip of reciprocating pump (3) Air vessels With neat sketches where ever required **(6M)**

Unit - V

9. (a) Derive expressions for Hydraulic mean radius and the side slope of the economical Trapezoidal channel **(6M)**

(b) Discharge of 10 m^3/s is allowed to pass through a rectangular channel of width 3.5m having a depth of water equal to 1.5 calculate critical depth of that channel and the corresponding specific energy **(6M)**

(OR)

10. (a) A discharge of 25 m^3/s is allowed in a trapezoidal channel having a base width of 2.5m and side slopes equal to 1:1.5 depth of water in the channel is equal 1.5m and longitudinal slope of the channel is equal to 1 in 5000 value of manning's coefficient is equal to 0.015 calculate the velocity of flow and Chezy's constant C **(6M)**

(b) During a rapidly varied flow the post jump depth is equal 2.5m and the Froude number corresponding to post jump is equal to 0.5 calculate the pre jump depth , energy loss in the rapidly varied flow and height of the jump **(6M)**

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Hall Ticket No : **Question Paper Code :**

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)
III/IV B. Tech I- Semester Regular Examinations Nov - 2017
GEOTECHNICAL ENGINEERING-I
(CIVIL)

Time: 3 hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT-I

1. a) Describe briefly the origin of soils and bring out the factors which control their formation. **(6M)**

   b) The following data are available in connection with the construction of an embankment.
   Soil from borrow pit: γ_d = 17.5 kN/m^3 and w= 12%
   Soil after compaction: γ_d = 20.0 kN/m^3 and w= 18%

   Estimate the quantity of soil to be excavated from the borrow pit and the amount of water to be added for every 100 m^3 of compacted soil of the embankment. **(6M)**

(OR)

2. a) Derive from fundamentals the following Equation: **(6M)**

$$¥ = \frac{(G + Se)¥_w}{1 + e}$$

   b) The dry unit weight of a sand sample in the loosest state is 13.34 kN/m^3 and in the densest state, it is 21.19 kN/m^3. Determine the Relative density of this sand when it has a porosity of 33%. Assume the grain specific gravity as 2.68. **(6M)**

UNIT-II

3. a) What are Consistency limits? What is their significance? **(6M)**

   b) The following are the test results of a soil sample. Classify the soil.

   Passing 4.75mm sieve= 64%; Passing 75µ sieve= 6% ;
   Coefficient of Uniformity= 7.0 ; Coefficient of curvature= 3.0
   Plasticity Index= 3. **(6M)**

(OR)

4. a) Explain the objective of classifying the soil for engineering purpose. List out the laboratory tests necessary for classifying any type of soil. **(6M)**

   b) Draw the plasticity chart and explain the classification of fine grained soils. **(6M)**

UNIT-III

5. a) The water table in a certain area is at a depth of 2.5 m below the level ground surface. To a depth of 8 m, the soil consists of fine sand having average porosity of 0.5 and G=2.65. Above the water table, the sand is saturated with capillary water right up to ground surface. Calculate and show with the aid of the diagrams, the total stress, the neutral stress and the effective stress at a depth of 0.0 m, 0.8 m and 4 m from the surface. **(6M)**

b) Two columns P and Q are 4 m apart, the load on column P is 300 kN and the load on column Q is 500 kN. The loads can be considered as point loads. Calculate the vertical stresses in the soil 2.5 m below the column foundations vertically below P and Q. **(6M)**

(OR)

6. a) Distinguish between Boussinesq's and Westergaard's methods of calculating stresses in a soil mass due to external loading. Discuss which method you would prefer and why? **(6M)**

b) A falling head permeability test was carried out on a 12.7 cm long sample of silty clay. The diameter of the sample and the stand pipe were 10cm and 1.0 cm respectively. The water level in the stand pipe was observed to fall from 80 cm to 60 cm in 12minutes. Determine the co-efficient of permeability of the soil and height of water level in the stand pipe after another 12 minutes. **(6M)**

UNIT-IV

7. a) What is piping failure in hydraulic structures? Briefly explain the measures that can be adopted to prevent piping failure. **(6M)**

b) A homogeneous earth dam is 43 m high with 3 m as free board and has 30 m long horizontal filter at the downstream end. The flow net for the dam section consists of 5 flow channels and 15 potential drops. If the dam is 500 m long and the permeability of the dam material is 3×10^{-5} m/s, determine the total seepage loss through the dam. **(6M)**

(OR)

8. a) What is the principle of compaction? Draw the typical compaction curves and compare for (i) Gravelly soil (ii) Sandy soil (iii) Silty soil (iv) Clayey soil. **(6M)**

b) The following observations are obtained from a standard compaction test. Find out Optimum Moisture Content and Maximum Dry Density if the volume of the mould is 1000cc. Plot the zero air void line, if G=2.67. **(6M)**

Weight of soil (kgf)	1.68	1.85	1.91	1.87	1.85	1.83
Water content (%)	8	11	14	16	18	20

UNIT-V

9. a) Mention any four causes for preconsolidation of soils. How is the preconsolidation pressure determined?. **(6M)**

b) A soft normally consolidated clay layer is 20-m thick with a moisture content of 45%. The clay has a saturated unit weight of 20 kN/m^3, a particle specific gravity of 2.7, and a liquid limit of 60%. A foundation load will subject the center of the layer to a vertical stress increase of 15 kPa. Groundwater table (GWT) is at the surface of the clay. Assuming ¥$_w$ = 10 kN/m^3, estimate

(i) The initial and final effective stresses at the center of the layer.

(ii) The consolidation settlement of the foundation if the initial effective stress at the center of the soil is 100 kPa. **(6M)**

(OR)

10. a) Distinguish clearly between Primary and secondary consolidation. **(6M)**

b) In a consolidation test done in the laboratory, a 20-mm-thick sample is consolidated 50% in 15 min with double drainage. In how much time a 5.0-m-thick layer of the same soil will consolidate 50% and 30%? If the soil layer has impervious rock below, how much time it will take to consolidate 50% and 30%? **(6M)**

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Hall Ticket No : **Question Paper Code :**

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)
III/IV B. Tech I- Semester Regular Examinations Nov - 2017
REINFORCED CONCRETE STRUCTURES-1
(CIVIL)

Time: 3 hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit - I

1. (a) Explain the following
   (i)Characteristic strength of material and Characteristic load.
   (ii)Limit state of collapse and limit state of serviceability. **(4 M)**

   (b) Design a rectangular simply supported beam over a clear span of 4.2m if the super imposed load is 20kN/m and support width is 300mm each. Use M_{20} grade concrete & Fe_{415} steel. Check the beam for stiffness. **(8 M)**

(OR)

2. (a) What is the difference between under reinforced section and over reinforced section? **(4 M)**
   (b) Design a rectangular reinforced concrete beam for a clear span of 4m.The super imposed load is 35kN/m and the size of the beam is limited to 250mm x 400mm. Use M_{20} grade concrete & Fe_{415} steel. Support width is 300mm each and effective cover is 40mm. **(8 M)**

Unit – II

3. (a) What are the advantages of T-beams. **(2 M)**

   (b)Calculate the moment of resistance of T-beam with the following data
   Width of flange = 800mm
   Thickness of slab = 110mm
   Width of rib = 300mm
   Effective depth = 600mm
   Area of tension steel = 2500mm^2
   Grade of concrete = M_{25}
   Grade of steel = Fe415 **(10 M)**

(OR)

4. (a) Explain about Bond stress. (3M)
   (b) A singly reinforced rectangular beam 300mm x 600mm effective depth carries a uniformly distributed load of 40kN/m including its self weight over a simply supported span of 6m and is reinforced with 5bars of 25mm diameter of which 2 bars are cranked up near the support.Fe415 grade steel & M_{20} grade concrete are used. Design the beam for shear reinforcement at support. **(6 M)**

Unit – III

5. Design a two way slab for a room 4m x 3.5m clear size, if the super imposed load is 3kN/m^2 and floor finish of 1KN/m^2.The edges of the slab are simply supported and corners are not held down .Use M_{20} grade concrete and Fe_{415} steel. **(12M)**

(OR)

6. Design the floor slab for a hall 4m x 5m to carry a live load of 3kN/m^2 and floor finish of 1kN/m^2.The slab is continuous over two adjacent walls of the hall. Walls are 300mm wide. Use M_{20} grade concrete and Fe_{415} steel. **(12M)**

Unit - IV

7. Design a circular column of diameter 400mm, with lateral ties subjected to a working load of 1200KN. Use M20 grade concrete and Fe415 steel. The column is 3m long effectively held in position and direction at both the ends. **(12M)**

(OR)

8. Design a square column of 400mm x 400mm, 3.3 meters long subjected to a working load of 1000kN. Use M_{20} grade concrete and Fe_{415} steel. The column is effectively held in position and direction at both the ends. **(12M)**

Unit - V

9. A reinforced concrete column of size 300mm x 300mm carries a load of 750kN. The safe bearing capacity of soil is 200kN/m^2. Design an isolated column footing with uniform thickness. Use M_{20} grade concrete and Fe_{415} steel. **(12M)**

(OR)

10. Design a footing for a column of size 400mm x 400mm which carries a load of 800KN. SBC of soil is 200kN/m^2. Use M_{20} grade concrete and Fe_{415} steel. One side of footing is to be restricted to 1.5m. **(12M)**

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Hall Ticket No : **Question Paper Code :**

ANIL NEERUKONDA INSTITUTE OF TECHNOLOGY & SCIENCES
(AUTONOMOUS)
III/IV B. Tech I- Semester Regular Examinations Nov - 2017
STRUCTURAL ANALYSIS-II
(CIVIL)

Time: 3 hours **Max Marks: 60**

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

UNIT-I

1. Find the forces in the members of the given truss (Figure 1)? Both the supports are hinged. Cross sectional area of vertical members is 32 cm^2 and for other members is 20 cm^2. Take E=2 x 10^5 N/mm^2 **(12M)**

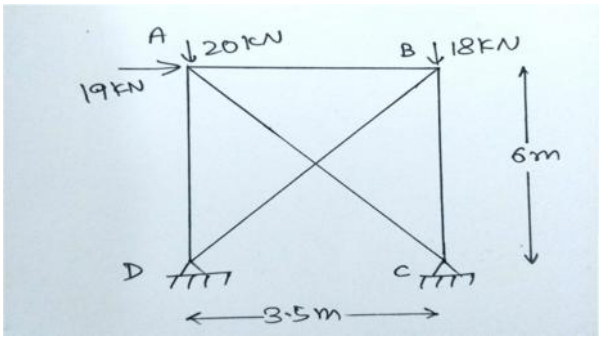

Figure-1

(OR)

2. Find the forces in the members of the given truss (Figure 2)? Cross sectional area of all members is 20 cm^2. Take E=2 x 10^5 N/mm^2 **(12M)**

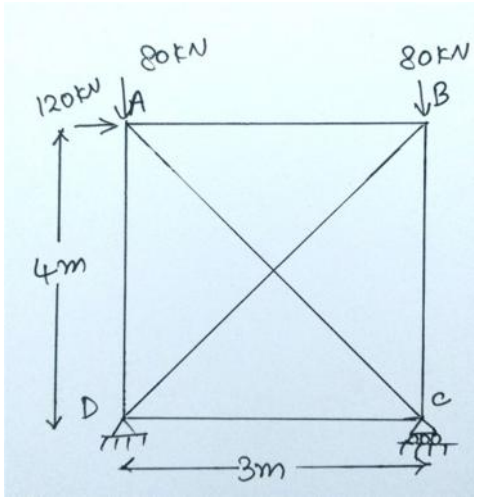

Figure-2

UNIT-II

3. Analyse the following frame (Figure 3) using Slope Deflection method. Draw B.M.D. Flexural rigidity for all members is same. **(12M)**

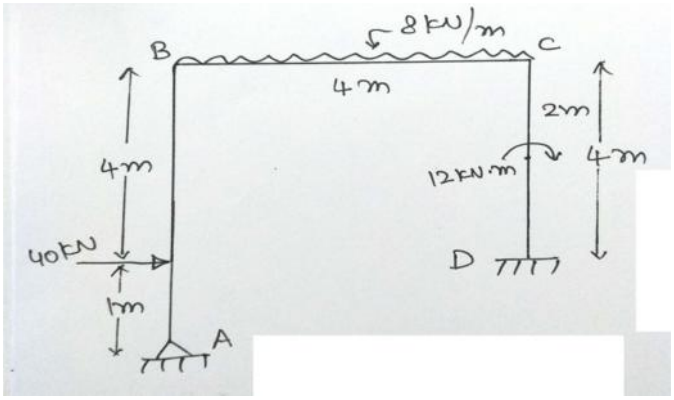

Figure-3

(OR)

4. Analyse the following frame (Figure 4) using moment distribution method? Draw B.M.D. **(12M)**

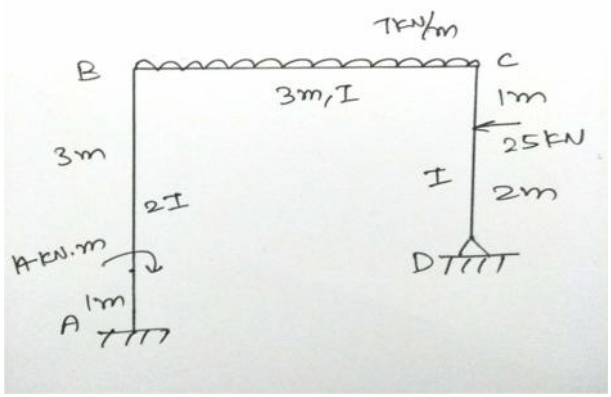

Figure-4

UNIT-III

5. Analyse the following frame (Figure 5) using Kani's method? Draw B.M.D **(12M)**

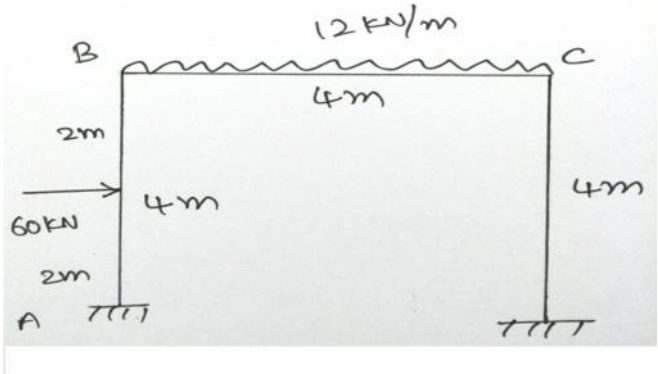

Figure-5

(OR)

6. Analyse the following frame (Figure 6) using Column Analogy method? Draw B.M.D. Flexural rigidity for all members is same **(12M)**

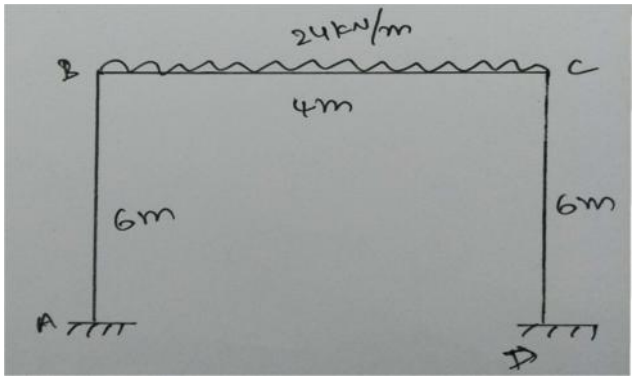

Figure-6

UNIT-IV

7. A two hinged parabolic arch of span 32 m and rise 6 m carries a uniformly distributed load of 40 kN/m covering a distance of 12 m from left end. A point load of 20 kN is acting at 9 m from left end. Find horizontal thrust. Solve the problem from fundamentals. Do not use formulae? **(12M)**

(OR)

8. A two hinged Circular arch of span 25 m and rise 5 m carries a uniformly distributed load of 30 kN/m covering a distance of 10 m from left end. Find the horizontal thrust, the reactions at the hinges and the maximum negative moment? **(12M)**

UNIT-V

9. A three hinged stiffening girder of a suspension bridge of 80 m span is subjected to two point loads 10 kN each placed at 25 m and 35 m, respectively from the left hand hinge. Determine the bending moment and shear force in the girder at section 40 m from each end. Also determine the maximum tension in the cable which has central dip of 10 m?

(12M)

(OR)

10. A suspension bridge of 102 m span has 2 members of three hinged stiffening girders supported by two cables having a central dip of 10 m. The road way has a width of 6.5 m. The dead load on the bridge is 7 kN / m^2 while the live load is 12 kN/m^2, which covers the left half of the span. Find shear force and bending moment at 26 m from left end. Find the maximum tension in the cable for this position of live load? **(12M)**

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