USN ☐☐☐☐☐☐☐☐☐☐   **10CV71**

Seventh Semester B.E. Degree Examination, June/July 2016

Environmental Engineering – II

Time: 3 hrs.   Max. Marks:100

Note: *Answer FIVE full questions, selecting*
at least TWO questions from each part.

PART – A

1   a.   Write the differences between water supply pipes and sewers. **(06 Marks)**
    b.   Mention the factors affecting quantity of storm water. **(06 Marks)**
    c.   The catchment area is of 300 hetctares. The surface covers in the catchment classify as given below.

Type	Co-efficient	% Area
Roof	0.90	15
Pavement and Yards	0.80	15
Lawn and garden	0.15	25
Roads	0.40	20
Open ground	0.10	15
Single family dwelling	0.50	10

Calculate the Runoff coefficient and quantity of storm water run-off. If intensity of rainfall is 30mm/h for rain with duration equal to time of concentration. If population density in the area is 350 person per hectare and rate of water supply is 200ℓpcd. Calculate design discharge for combined system. Take $Q_{peak} = 2$. **(08 Marks)**

2   a.   State the hydraulic formulas which are commonly adopted in design of sewers. Explain any one in brief. **(06 Marks)**
    b.   Explain the phenomenon of crown corrosion with the help of neat sketch. How can this be avoided? **(06 Marks)**
    c.   Calculate the velocity of flow and corresponding discharge in a sewer of circular section having diameter equal to 1m laid at a gradient of 1 in 500. The sever runs at 0.6 depth. Use mannings formula taking N = 0.012. **(08 Marks)**

3   a.   Mention the classification of trap according to use and location of these traps in house drainage connections. **(06 Marks)**
    b.   Explain various principles that should be kept in mind while designing a house drainage system. **(06 Marks)**
    c.   Briefly explain sewer appurtenances with neat sketch (i) Drop manhole (ii) removes low density material which affect the growth of aerobic bacteria during treatment process. **(08 Marks)**

4   a.   Briefly explain the laboratory procedure for determining the BOD of waste water. **(08 Marks)**
    b.   The BOD of a sewage incubated for one day at 30°C has been found to be 100mg/ℓ. What will be the 5 day 20°C BOD? Assume K = 0.12 (Base 10) at 20°C. **(06 Marks)**
    c.   With the help of neat sketch explain carbon and Nitrogen cycle. **(06 Marks)**

PART – B

5 a. Discuss fully the action involved in self purification of Natural water. (06 Marks)
   b. What is sewage sickness? How sewage sickness can be prevented? (06 Marks)
   c. Using the following data find out Do at the end of 1st and 2nd day.

	River	Wastewater
Flow (m^3/s)	25	2
DO (mg/ℓ)	9.1	0
5day BOD (mg/ℓ)	2	200

Take deoxygenation constant as 0.1 per day and reoxygenation constant as 0.3 per day. Take saturation DO as 9.1 mg/ℓ (08 Marks)

6 a. Explain the flow diagram employed for a conventional waste water treatment plant. Indicate the importance of each unit indicated in the flow diagram. (06 Marks)
   b. Explain the functioning of screens and grit chamber in the treatment of municipal waste water. (06 Marks)
   c. Design a rectangular sedimentation tank for population of 90000 with rate of water supply 140ℓpcd 80% of which reaches treatment plant. Assume peak factor 1.2 and velocity of flow 0.3 m/min. (08 Marks)

7 a. Draw a neat sketch of trickling filter and label the part. Mention the merits of trickling filters. (06 Marks)
   b. Mention modifications of Activated sludge process and explain any two. (06 Marks)
   c. Define the following :
       i)   Hydraulic retention time (HRT)
       ii) Volumetric BOD_5 loading
       iii) F/M Ratio
       iv) Sludge age (08 Marks)

8   Write explanatory notes on :
   a. Methods of sludge disposal
   b. Septic tank
   c. Recycling of waste water
   d. Oxidation pond. (20 Marks)

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Seventh Semester B.E. Degree Examination, June/July 2016
Design of Steel Structures

Time: 3 hrs.   Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting*
atleast TWO questions from each part.
2. Use of IS800-2007 and steel tables are allowed.

PART – A

1   a. Explain the Design basis of limit state design.   **(08 Marks)**
     b. List out the difference between limit state of strength and limit state of serviceability.
                                                                (06 Marks)
     c. Explain the factors which govern the ultimate strength of steel structures.   **(06 Marks)**

2   a. Mention the bolt terminology with a neat sketch of group of bolts.   **(03 Marks)**
     b. Design a bolted connection between the flange of a column ISHB 450@907 N/m and a bracket plate 15 mm thick. The bracket plate is supporting a load of 150 kN at an eccentricity of 350 mm. Adopt HSFG bolts of property class 8.8.   **(17 Marks)**

3   A bracket plate is used to transfer the reaction of beam to a column flange of ISHB 300@618 N/m. A fillet weld of 6 mm is used to connect the plate and column flange as shown in Fig.Q3. Find whether the connection is safe or not.   **(20 Marks)**
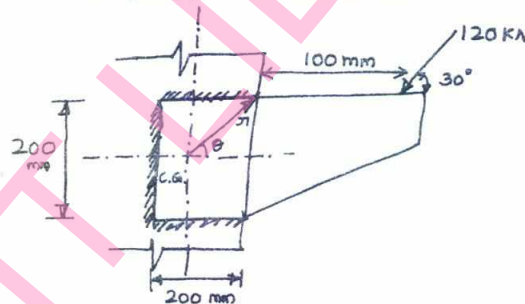

Fig.Q3

4   a. Considering the simply supported beam subjected to gradually increasing concentrated load W, at the center, show that
        (i) $M_y = 2/3 = M_p$
        (ii)   The hinge length of the plasticity zone is equal to $1/3^{rd}$ of the span.   **(06 Marks)**
     b. Explain the methods of plastic analysis.   **(04 Marks)**
     c. Determine the plastic and section modulus of a built up section as shown in Fig.Q4(c).
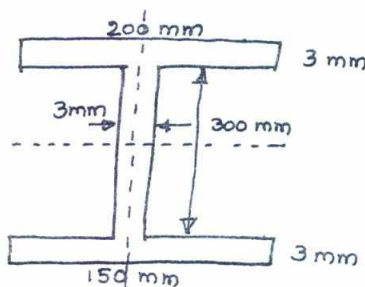   **(10 Marks)**

Fig.Q4(c)

PART – B

5   Design the member consists of a single angle to carry a tensile force of 200 kN. The length of tension member is 3.5 m and subjected to reversal stresses due to wind forces. If the yield strength and the ultimate strength of the steel used are 250 MPa and 410 MPa and using 18 mm bolts.   **(20 Marks)**

6   Design a laced and battened column with two channels back to back of length 8 m to carry an axial factored load of 1000 kN. The column is hinged at both ends.   **(20 Marks)**

7   a. Explain the types of column bases.   **(04 Marks)**
    b. Design a slab base for an ISHB 350@661.2 N/m column to carry a factored load of 1000 kN. M_{25} concrete and Fe 415 grade steel is used for the foundation.   **(16 Marks)**

8   a. What are the factors, which affects lateral stability?   **(03 Marks)**
    b. Design a cantilever beam which is built in to concrete wall and carrying a load of 25 kN/m and live load of 10 kN/m. The span of beam is 5 m.   **(17 Marks)**

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Seventh Semester B.E. Degree Examination, June/July 2016
Estimation and Valuation

Time: 3 hrs.   Max. Marks:100

Note: Note: 1. *Answer Q.No. 1 which is compulsory, Answer any FOUR questions by selecting any TWO from part B and TWO from part C each.*
       2. *Missing data, if any, may be suitably assumed.*

PART – A

1   The Fig. Q1(a) shows the detail of a residential building with a ceiling height of 3.5m. Workout the quantities for following items.

    a.   Earthwork in excavation for foundation in ordinary soil @ Rs 211/cum
    b.   Plinth concrete of DDC 1:2:4 at the rate of Rs 4200/cum
    c.   1st class brick work in CM 1:6 for superstructure at rate of Rs 3500/cum
    d.   Ceiling plastering at rate of Rs 189/sqm

       $D_1 = 0.9 \times 2.1m$, $D_2 = 1.2 \times 2.1m$
       $W_1 = 1.5 \times 1.35m$, $W_2 = 1.2 \times 1.35m$, $W_3 = 1.2 \times 1.35m$
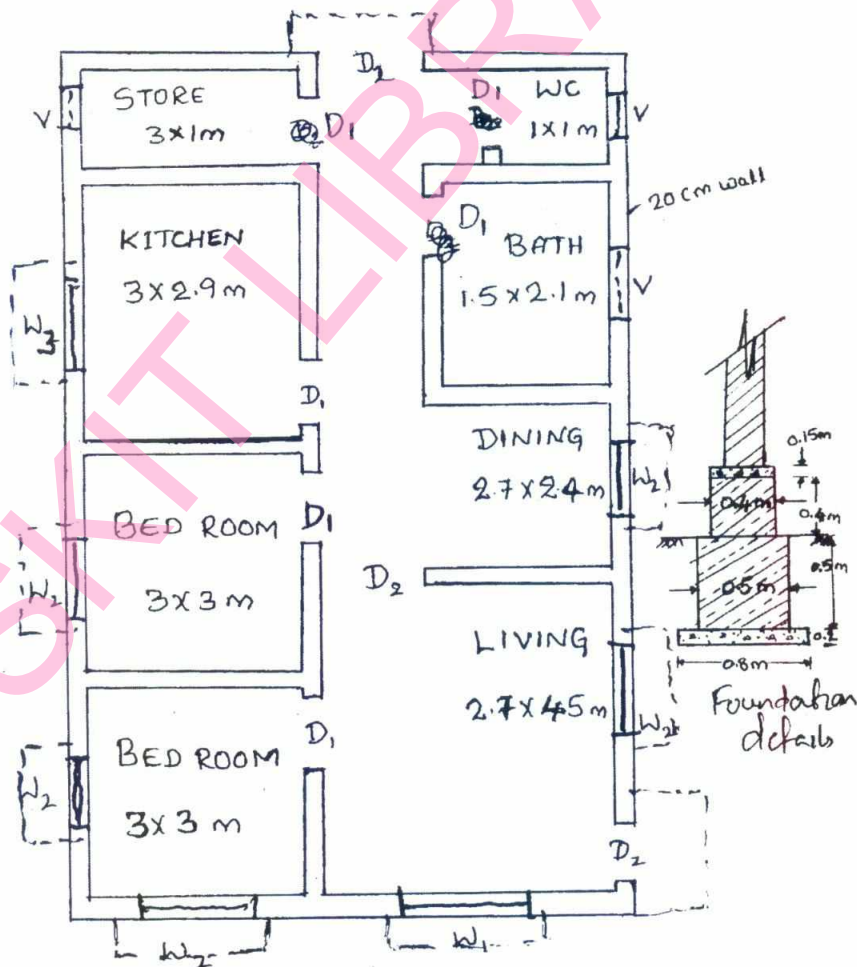 $V = 0.9 \times 1.2$.

Fig. Q1(a)
Assume lintel over door and windows ventilators.   **(40 Marks)**

PART – B

2 Write detailed specification for any three of the following:
   a. B.B masonry in cm 1:6 for superstructure
   b. RCC roof slab with CC1:1½ : 3
   c. Size stone masonry in CM 1:6 for basement
   d. Ceiling plastering in CM 1:4   (15 Marks)

3 Workout from the first principles the rate analysis for any three of the following :
   a. Size stone masonry for foundation in CM 1:8
   b. BED concrete CC 1:4:8 for foundation
   c. Burnt brick masonry for superstructure in CM 1:6
   d. 12mm thick plastering for superstructure.   (15 Marks)

4 a. What is an estimate? Briefly explain different types of estimate.   (07 Marks)
   b. Briefly explain (any two)
       i) Security deposit and EMD
       ii) Tender and quotation
       iii) Work charged establishment.   (08 Marks)

PART – C

5 a. Briefly explain contact and different types of contract.   (07 Marks)
   b. Briefly explain (any two)
       i) Administrative approval and technical sanction
       ii) Measurement book and schedule of rates
       iii) Purpose of specification.   (08 Marks)

6 a. What is meant by specification? Explain briefly types of the specification.   (07 Marks)
   b. Explain briefly purpose of valuation. What are the methods of valuation? Explain briefly.   (08 Marks)

7 Estimate the cost of RCC roof slab in CC 1: 1½ : 3 over a room of internal size 3m × 4m. Also calculate the quantity of materials required, given
Slab thickness : 15cm
Steel reinforcement :
Main steel : 10mm ϕ at 150mm C/C
Distribution steel : 8mm ϕ at 200mm C/C
Assume local prevailing rates and 30 cm wall thickness.   (15 Marks)

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Seventh Semester B.E. Degree Examination, June/July 2016
Design of Prestressed Concrete Structures

Time: 3 hrs.   Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting*
atleast TWO questions from each part.
2. Use of IS:1343-1980 is permitted.
3. Assume any missing data suitably.

PART – A

1   a.   Define the following :
        i) Tendon   ii) Pretensioning   iii) Post tensioning   iv) Load balancing   **(08 Marks)**
    b.   Explain how PSC is more advantageous as compared to RCC.   **(06 Marks)**
    c.   Explain with neat sketch, Freyssinet system of post tensioning.   **(06 Marks)**

2   a.   A concrete beam with a double overhang has the middle equal to 10 m and the equal overhang on either side is 2.5 m. Determine the profile of the prestressing cable with an effective force of 250 kN which can balance a uniformly distributed load of 8 kN/m on the beam, which included the self weight of the beam. Sketch the cable profile marking the eccentricity of cable at the support and midspan.   **(10 Marks)**
    b.   A rectangular concrete beam of cross section 120 mm wide and 300 mm deep is prestressed by a straight cable carrying an effective force of 180 kN at an eccentricity of 50 mm. The beam supports an imposed load of 3.14 kN/m over a span of 6 m. If the modulus of rupture of concrete is 5 N/mm^2, evaluate the load factor against cracking assuming the selfweight of concrete as 24 kN/m^3.   **(10 Marks)**

3   a.   A pretensioned beam of rectangular cross-section 150 mm wide and 300 mm deep is prestressed by 8, 7 mmϕ wires located 100 mm from the soffit of the beam. If the wires are initially tensioned to a stress of 1100 N/mm^2, calculate the effective stress after all losses, given the following:
        Relaxation of steel = 70 N/mm^2 ;   Shrinkage of concrete = 300×10^{-6}
        Creep of concrete = 1.6   ; E_s = 210 kN/mm^2 and E_c = 31.5 kN/mm^2 **(12 Marks)**
    b.   A simply supported post tensioned concrete beam of span 15 m has a rectangular cross section 300×800 mm. The prestress at ends is 1300 kN with zero eccentricity and 250 mm at the centre the cable profile being parabolic. Assuming k = 0.0015 per m and μ = 0.35. Determine the loss of stress due to friction at the centre of the beam.   **(08 Marks)**

4   a.   Write short note on prediction of long term deflections.   **(06 Marks)**
    b.   A PSC beam of rectangular section 120 mm wide and 300 mm deep spans over 6 m. The beam is prestressed by straight cable carrying an effective force of 180 kN at an eccentricity of 50 mm. If it supports an imposed load of 4 kN/m and modulus of concrete is 38 kN/mm^2. Compute the deflection at the following stages and check whether they comply with the IS code specifications. Take density of concrete as 24 kN/m^3.
        (i)   Upward deflections under (Prestress + Selfweight)
        (ii) Final downward deflections under (Prestress + Selfweight + imposed load) including the effects of creep and shrinkage assuming the creep coefficient as 1.8 and loss of prestress = 20%   **(14 Marks)**

PART – B

5   a.   Discuss the different types of failure of PSC beam.   (06 Marks)
    b.   A pretensioned PSC beam of Double Tee section having a flange 1200 mm wide and 150 mm thick is prestressed by 4700 mm^2 of high tensile steel located at an effective depth of 1600 mm. The ribs have a thickness of 150 mm each. If the cube strength of concrete is 40 N/mm^2 and tensile strength of steel is 1600 N/mm^2, determine the flexural strength of the double T girder using IS : 1343 provisions.   (14 Marks)

6   a.   A concrete beam of rectangular section, 200 mm wide and 400 mm deep, is prestressed by a a parabolic cable located at an eccentricity of 100 mm at midspan and zero at the supports. If the beam has a span of 10 m and carries a uniformly distributed live load of 4 kN/m, find the effective force necessary in the cable for zero shear stress at the support section. For this condition calculate the principal stresses. The density of concrete is 24 kN/m^3.   (10 Marks)
    b.   If the support section of a PSC beam 100 mm wide and 250 mm deep is required to support an ultimate shear force of 80 kN. The compressive prestress at the centroidal axis is 5 N/mm^2. The characteristic cube strength of concrete is 40 N/mm^2. The cover to the tension reinforcement is 50 mm. If the characteristic tensile strength of stirrups is 415 N/mm^2, design suitable shear reinforcements in the section using IS code recommendations.

(10 Marks)

7   a.   Explain the analysis of anchorage zone stresses in post tensioned members. How is the bursting tensile force calculated?   (08 Marks)
    b.   A high tensile cable comprising 12 strands of 15 mm dia with an effective force of 2500 kN is anchored concentrically in an end block of a post-tensioned beam. The end block is 400 mm wide and 800 mm deep and the anchor plate is 200 mm wide by 260 mm deep. Design suitable anchorage zone reinforcements using Fe415 grade HYSD bars using IS:1343 code provisions.   (12 Marks)

8   A post tensioned prestressed concrete beam of rectangular section 300 mm wide is to be designed to resist a live load moment of 360 kNm on a span of 12 m. Assuming 10% loss and limiting tensile and compressive stress to 1.5 MPa and 18 MPa respectively. Calculate the minimum possible depth and the prestressing force and corresponding eccentricity. Take $D_c = 24$ kN/m^3.   (20 Marks)

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Seventh Semester B.E. Degree Examination, June/July 2016
Air Pollution and Control

Time: 3 hrs.   Max. Marks:100

Note: *Answer any FIVE full questions, selecting atleast TWO questions from each part.*

PART – A

1   a. Define Air Pollution. Explain primary and secondary air pollutants with examples.
                                                                         (10 Marks)
   b. How London smog is different from Los Angeles smog? Explain.   **(10 Marks)**

2   a. Explain briefly the harmful effects of sulfur dioxide on human being and plants. **(10 Marks)**
   b. Explain the effects of Air pollutants on materials.   **(10 Marks)**

3   a. Explain with a neat sketches, how plume behave in different atmospheric stability condition.
                                                                          (10 Marks)
   b. Define Windrose. Explain the importance of windrose in air pollution studies.   **(10 Marks)**

4   a. Discuss the factors to be considered for locating an industrial plant with reference to the air pollution.   **(10 Marks)**
   b. Explain the importance of proper planning and zoning of industrial and residential areas from the point of air pollution control.   **(10 Marks)**

PART – B

5   a. What are the basic considerations of air sampling? Discuss.   **(08 Marks)**
   b. Explain the procedure for the collection of suspended particulates by high volume sampler.
                                                                      (12 Marks)

6   a. List the advantages and disadvantages of cyclones separator and also mention their industrial applications.   **(10 Marks)**
   b. Explain with a neat sketch spray tower wet scrubber.   **(10 Marks)**

7   a. Explain air pollution due to gasoline and diesel engines.   **(10 Marks)**
   b. What are the causes of acid rain and discuss their remedial measures?   **(10 Marks)**

8   Write short notes on the following :
   a. Global warming.
   b. Ozone layer depletion.
   c. Bhopal gas tragedy.
   d. Meteorological models.   **(20 Marks)**

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