free·1 – PC

(REVISED COURSE)

22/12/201 MP-5467 PC

Dec. 2011

(3 Hours)

[Total Marks : 100   Dec 11

N.B. : (1) Question No. 1 is compulsory.
     (2) Answer any four questions out of remaining six questions.
     (3) Assume any **suitable** data if **required.**
     (4) Use of IS 1343–1989 is permitted.

1. (a) Explain in detail Freyssinet anchorage system. (Post tensioning)   5
    (b) Explain the concept of pressure line and internal resisting couple method.   5
    (c) What do you mean by safe cable zone in post tensioned P.C. members ? Why   5
         is it required to find out this zone ?
    (d) What is end zone in post tensioned P.C. member ? Discuss about the stresses   5
         distribution in end zone.

2. (a) A prestressed concrete bridge deck comprises unsymmetrical I-section beams   10
         spanning over 12 m. The c/s of a typical beam is shown in **figure.** The beam is
         prestressed by seven Freyssinet cables, each carrying an effective force of 300
         kN located 200 mm from the soffit at the centre of span section. If the total Bending
         moment at the centre of span of the girder is 3600 kN-m. Determine the resultant
         stress developed at the section using internal resisting couple method.
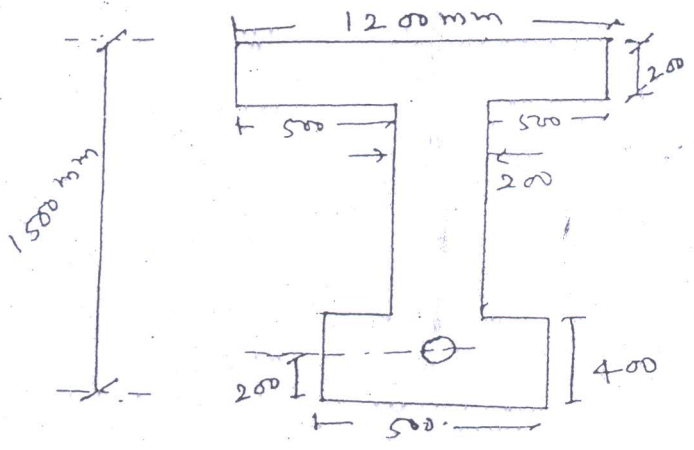
    (b) A rectangular concrete beam of c/s 200 mm x 400 mm is pressed by means of   10
         18 wires of 6 mm dia located 60 mm from the bottom of the beam and 06 wires
         of dia, 8 mm 40 mm from top. Assuming prestress in the steel as 1000 N/mm^2.
         Calculate the stresses at the extreme fibres of the m.d span section when the
         beam is supporting its own weight over a span of 5 m. If u.d.l. 6 of kN/m is imposed,
         Determine the maximum working stress in conc.
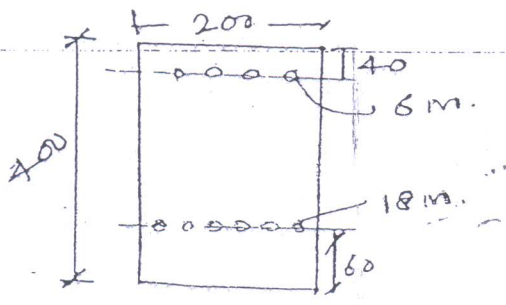
[TURN OVER

3. (a) Explain loss due to creep of concrete.   4
   (b) A post tensioned cable of a beam 10 m long is initially tensioned to a stress of   10
       1000 N/mm² at the one end. If the tendons are curved so that the slope is 1 in
       15 at each end with an area 600 mm².
       Calculate the loss of prestress due to friction given the following data. Coefficient
       of friction between duct and cable is 0·55. Friction coefficient for wave effect = 0·0015/m.
       During anchoring, if there is a slip of 3 mm at the jacking end, calculate the Final
       Force in the cable and the percentage loss of prestress due to friction and slip.

   (c) A pretensioned, T-section has c/s as shown in figure.   6
       Given Ap = 200 mm². fck = 50 N/mm²
       fp = 1600 N/mm². Determine the ultimate moment capacity of the T-section using
       the IS code regulations.
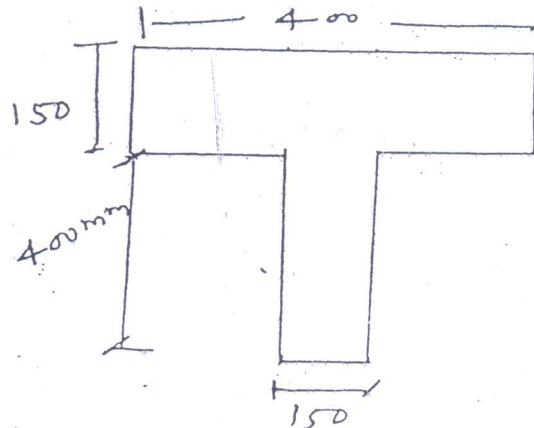
4. (a) A concrete beam having a rectangular section 200 mm wide and 450 mm deep   12
       is prestressed by a parabolic cable carrying an initial force of 240 kN the cable
       has an eccentricity of 50 mm at the centre of span and is concentric at the supports.
       If the span of beam is 10 m and the live load is 2 kN/m. Determine the short
       time deflection at the centre of span. Assuming Ec = 38 kN/mm², creap co-efficient
       $\phi = 2·0$ Loss of prestress = 20% of the initial stress after 6 months. Determine
       long time deflection at the centre of span at this stage, assuming that the DL
       and LL are simultaneously applied after the release of prestress.

   (b) A Concrete beam of rectangular section 200 mm × 600 mm is prestressed by a   8
       parabolic cable located at an eccentricity of 100 mm at mid span and zero at
       the supports. If the beam has a span of 10 m and carries a u.d. 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 principle stresses.

5. Design a post tensioned roof girder to suit the following data –   20
   Effective span   =   20m
   Live load   =   10kN/m
   Load factor, for DL = 1·5,
              LL = 1·6
   Cube strength of conc(f_{cu}) = 50 N/mm²
   Cube strength at transfer (f_{ci}) = 35 N/mm²
   Tensile strength of conc   (f_t) = 1·7 N/mm²
   E_c = 34 kN/mm² Loss ratio = 0·80
   (check for shear strength and check for deflection is not required)

6. (a) A deck slab of a rod bridge of span 12 m is to be designed as a one way slab   8
   with parallel post tensioned cables in each of which the force at transfer is 500
   kN. If the deck slab is required to support a u.d. live load of 20 kN/m² with the
   comp. and tensile stress in conc. at any stage not exceeding 15 N/mm² and
   zero N/mm² respectively calculate the max. horizontal spacing of the cables and
   their positions at the mid span section. Assuming the loss ratio = 0.85

   (b) The end block of a post tensioned PSC beam, 400 mm × 400 mm is subjected   12
   to concentric anchorage force of 900 kN by a Freyssinet anchorage area 12000
   mm². Design and detail the anchorage reinforcement for the end block.

7. Determine equivalent upward load and hence locate pre. line is it concordant cable ?   20
   If not make concordant by linear transformation.

$$M = \frac{(w)l^2}{8}$$

NB |← 7·5 →|
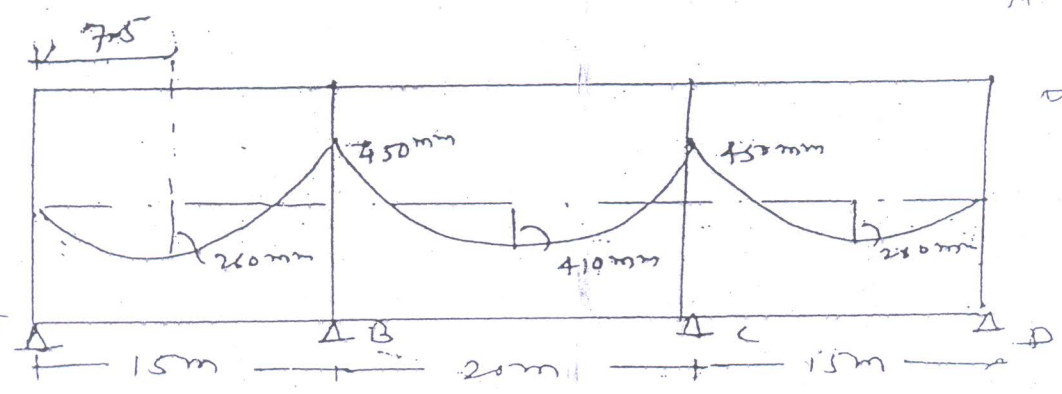
A system beam is symmetrically prestressed by a parabolic cable carrying 5000 kN
prestressing force.

Con. 6295-11.

Dec. 2011

(REVISED COURSE)

MP-5437

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. 1 is compulsory.
     (2) Attempt any four questions out of remaining six questions.
     (3) Illustrate answers with neat sketches wherever required.
     (4) Assume suitable data if necessary and state it clearly.

1. Solve any **five** :—   20
  (a) Define duty, delta and base period. Derive a relation between them.
  (b) What is run off and the factors which affects it ?
  (c) What are the various properties of the aquifer required to be studied in ground water hydrology ?
  (d) What are different modes of failure of a gravity dam ? Discuss in brief.
  (e) Describe the various components of a spillway.
  (f) Name the various regulation works on a canal. What are their function ?

2. (a) A 3-hour storm produced a flood hydrograph as under :—   10

Time (hr)	0	3	6	9	12	15	18	21	24	27	30
Discharge (cumec)	4	9	12	18	20	16	20	10	8	6	4

Assuming a constant base flow of 4 cumecs, determine the ordinates of unit hydrograph. The catchment area is 50 km².

  (b) Describe various types of rain gauges along with their advantages and disadvantages.   10

3. (a) The average monthly adjusted runoff of a river during a critical year are as follows —   10

Month	Jan.	Feb.	March	April	May	June	July	Aug.	Sept.	Oct.	Nov	Dec.
Run-off (ha-m)	500	350	650	600	300	650	7500	6000	3500	2500	600	700

If there is a uniform demand of 6 cumecs, determine the reservoir capacity by the analytical method.

 (b) Discuss the various factors which govern the selection of type of dam   10

4. (a) The ordinates of a unit hydrograph of 6-hr duration are given below at 2-hr interval. Compute the ordinates of the S-curve and hence derive the unit hydraograph of 2-hr duration.   10

Time (hrs)	0	2	4	6	8	10	12	14	16	18
Discharge (cumecs)	0	300	1000	2100	3500	5600	8500	10500	10000	7800

Time (hrs)	20	22	24	26	28	30	32	34	36	38
Discharge (cumecs)	5700	4800	4100	3440	2700	2140	1500	500	300	0

  (b) A well of diameter 30 cm fully penetrates a confined aquifer of thickness 15 m.   10 When pumped at a steady rate of 3 l.p.s., the drawdowns observed in wells at radial distances of 10 m and 40 m, are 1·50 m and 1·0 m respectively. Compute the radius of influence, the permeability, the transmissibility and the drawdown at the well.

[TURN OVER

5. (a) Check the stability of the gravity dam shown in the figure for the reservoir full condition. 10
Consider only weight of the dam, water pressure and uplift pressure. Assume
coefficient of friction between the base and foundation is 0·7, uplift pressure
intensity coefficient is 0·45 and unit weight of dam material is 24 kN/m³.
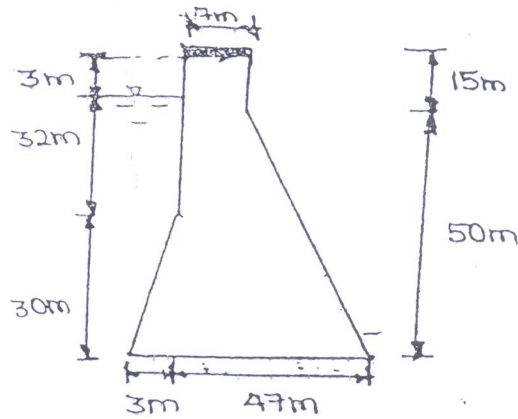
(b) Describe the various types of cross drainage works on a canal. In what condition, 10
each type is most suitable ?

6. (a) What are the different methods of irrigation ? State their advantages and 10
disadvantages.

(b) What are the various investigations required for reservoir planning ? 10

7. Write short notes on :— 20
　　(a) Water logging.
　　(b) Alignment of canal.
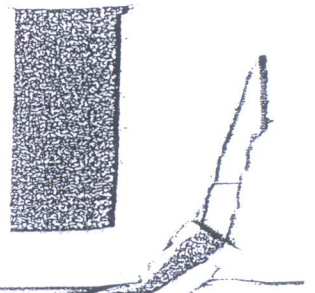　　(c) Selection of type of dam.
　　(d) Bucket-type energy dissipator.

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N.B. : (1) Question No. 1 is compulsory.
      (2) Attempt any four questions out of six questions.
      (3) Assume suitable data wherever necessary.

1. (a) Explain any one Air Pollution Episode.   5
   (b) Prove that 70 dB + 70 dB ≠ 140 dB in case of Sound Level Readings.   5
   (c) The 5 day 30°C BOD of a sewage sample is 120 mg/lit. Calculate its 5 day 20°C   5
       BOD. Assume the deoxygenation constant at 20°C, K_{20} as 0·1.
   (d) Write a short note on Intercepting Traps.   5

2. (a) Draw a flowsheet of sewage treatment plant employing Trickling Filter. Explain   10
       the process mechanism of trickling filter.
   (b) Describe Physical, Chemical and Biological characteristics of sewage and their   10
       significance in Waste Water Engineering.

3. (a) Explain with diagram each component of sewage Pumping Station. Why pumping   10
       of sewage is done ?
   (b) A grit chamber is designed to remove particles with a diameter of 0·2 mm, specific   10
       gravity 2·65 settling velocity for these particles has been found to range from
       0·016 to 0·022 m/sec, depending on their shape factor. A flow through velocity
       of 0·3 m/sec will be maintained by proportioning weir. Determine the channel
       dimensions for a maximum waste water flow of 10,000 cum/day.

4. (a) Explain with diagram different systems of plumbing.   10
   (b) Design a suitable rectangular sedimentation tank for treating the sewage from   10
       a city, provided with an assured public water supply system, with a maximum
       daily demand of 14 million litres per day. Assume D.T. 2 hrs and velocity of flow
       in the tank 0·3 m/minute.

5. (a) Draw a diagram, 'A typical water connection connecting the service pipes with   10
       the municipal water main'. Explain antisiphonage pipes.
   (b) What is digestion of sludge ? Explain the mechanism of anaerobic digestion.   10
       How liquid, solid and gaseous products are disposed off ?

6. (a) Explain the following terms related to activated sludge process :—   10
           (i) F/M
          (ii) S. V. I.
         (iii) Hydraulic retention time
          (iv) Sludge age
           (v) M L S S.
   (b) Calculate the diameter and discharge of a circular sewer at a slope of 1 in 400   10
       when it is running half full, and with a velocity of 1·8 m/sec. (n is Manning's
       formula = 0·012). Explain with diagram Drop Manhole.

7. Write short notes on any four of the following :—   20
   (a) Ozone depletion
   (b) Self purification of streams
   (c) Stabilization ponds
   (d) Disposal of the effluent from septic tanks
   (e) Green house effect
   (f) Land disposal method for disposal of sewage.

G S E 4 V

Dec. 2011

(REVISED COURSE)

17/12/11 MP-5462

Q.IV Dec 11

(4 Hours)

[Total Marks : 100

N.B. : (1) Question No. 1 is compulsory.
(2) Attempt any four questions out of remaining six questions.
(3) Assume suitable data, if required but state it clearly.
(4) Draw neat sketches wherever required and show all supporting calculations.

1. Figure No. 1 shows the plan and sectional details of a load bearing residential building.   20
Calculate the quantities of following items of work by referring the drawings :—
   (a) U.C.R. Masonry in foundation and plinth.
   (b) Ist Class brick Masonry in c.m. (1:5) in Super-structure.
   (c) 2.5 cm. thick D.P.C. (1:2:4).
   (d) Net quantity of internal plaster (12 mm thick) in c.m. (1:4).

PLAN
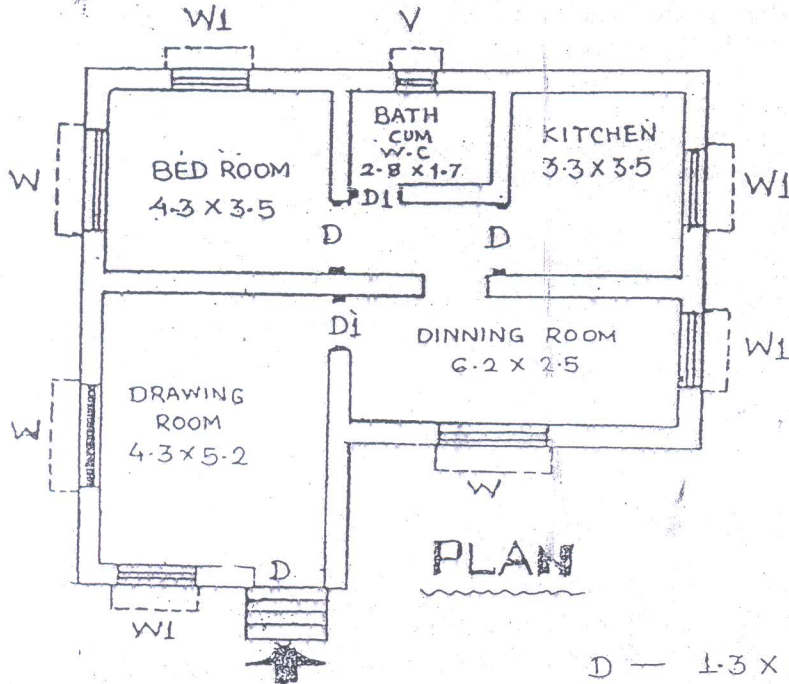
D — 1.3 × 2.1
D1 — 1.0 × 2.1
W — 2.0 × 1.4
W1 — 1.5 × 1.4

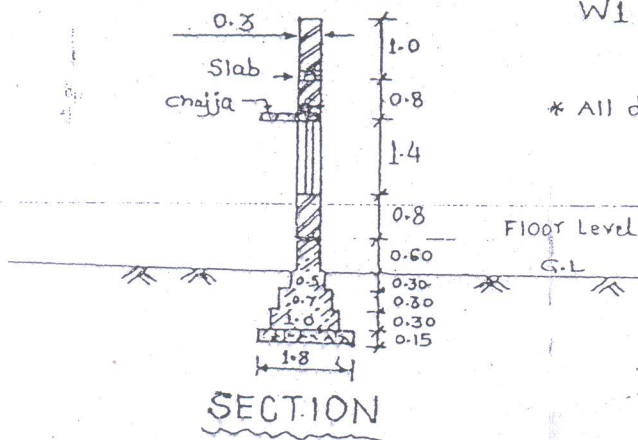* All dimensions are in meter.

SECTION

Fig No. 1   Q.1

[TURN OVER

2. (a)   Prepare abstract for all the items in **Question No. 1.**   *6*
    (b)   Prepare rate analysis for following items of work :—
        (i)   Ist class brick work in cement Mortor in super structure.   *7*
        (ii)   R.C.C. work (1:1·5:3) for column with 1% steel.   *7*

3. (a)   Explain various types of contract with their suitability.
    (b)   Prepare an approximate estimate for (G + 3) R.C.C. framed building with six flats on each floor, having carpet area of each flat 90 m² located in New Panvel region. Assume suitable cost of construction.

4. (a)   Draft a Notice inviting Tender for construction of fly over bridge in Suburban Mumbai.   *8*
        Estimated cost is Rs. 20 crores and time of completion expected by department is 12 Months.
    (b)   Explain :—   *12*
        (i)   Belting Method.
        (ii)   C.B.R.I. Method.
        (iii)   Escalation Clause.

5. (a)   Calculate the quantities of earth work in cutting and banking for a portion of road for 120 m. length with following data :—

Chainage (m)	0	20	40	60	80	100	120
R.L. of ground level (m)	171·7	170·9	170·6	171·3	171·8	172·1	172·4

        Formation width of road is 9 m. Formation level at starting chainage is 171·7 m. The road surface shall be given a falling gradient of 1 in 110.
        Side slope in cutting   —   1 V : 1·5 H
        Side slope in banking   —   1 V : 2 H
    Use Mid-Sectional Area Method.
    (b)   Explain :—   10
        (i)   Free hold and lease hold properties.
        (ii)   Purposes of Valuation.

6. (a)   A person has purchased a plot of land costing Rs. 10 lacs. and has constructed a   10 building thereon at a cost of Rs. 75 lacs.
        Allowing net return @7% on cost of land and @6% on cost of construction. work out Standard Rent of the property with the following data :—
        (i)   Sinking fund on 4% basis for future life of 75 years = 0·0022.
        (ii)   Annual Maintenance 1% of cost of construciton.
        (iii)   Municipal Taxes and other outgoings are 20% of gross rent.
    (b)   (i)   What is bar bending schedule ?   5
           Why it is required to be prepared ? Explain.
        (ii)   Differentiate between :—   5
           Revised estimate and Supplimentary estimate.

7. Write notes on followings :—   20
      (a)   Role of Quantity Surveyor in Civil Engg. Project
      (b)   Rules of deduction for plastering (IS 1200)
      (c)   Workmen Compensation Act
      (d)   Sinking fund
      (e)   Arbitral Tribunal and Award
      (f)   Mass haul diagram
      (g)   Pre-bid conference.

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