P. C May 10

civil 1316/10 VII

Con. 3978-10. Pc. AN–2665

May 2010 (R)

(3 Hours) [Total Marks : 100

N.B. : (1) Question No. 1 is compulsory answer any four from the remaining.
(2) Assume suitable data wherever required and state the same clearly.
(3) Support solutions with sketches.
(4) Use of 1343-1980 is permitted.

Q 1 a Why are high strength steel and high strength concrete used in prestressed concrete 05

b Explain the stress distribution in the end block 05

c Explain the losses in prestress in post tensioned beam at transfer and service 05

d Explain the safe cable zone in prestressed concrete members. 05

Q 2 a A Simply supported prestressed concrete beam of rectangular section 300x500mm loaded with total UDL of 200kN over a span of 5m. Sketch the distribution of stresses at the mid span and end span if the prestressing force is 1500kN. The eccentricity of the cable at the mid-span is 150mm from the soffit of the beam.Use a)Stress concept b) Strength concept and c)Load Balancing method 12

b An unsymmetrical prestressed beam has following dimension: 08

Top flange : 300x100mm (thk) Span of the beam : 8m
Bottom Flange : 200x100mm(thk) Live Load : 12 kN/m
Web : 250x80mm Initial Prestress : 1800MPa.
Area of wires : 385mm^2

Determine the eccentricity at which the prestress should be applied so that the net residual compressive stress at mid span under full live load is 5 MPa if the loss in prestress is 20% .
Concrete Density =24kN/m^3

Q 3 a An Unsymmetrical I-section bridge girder has following sectional properties: 12
Are of cross section =777x10^3 mm^2,Moment of Inertia =22x10^{10} mm^4 width and thickness of top flange is 1200mm and 360mm respectively is and web thickness is 240mm .The centroid of the section is located at 580mm from the top and the of the span is 40m.The tendons with a cross section of 700mm^2 are parabolic with an eccentricity of 1220mm at centre of the span and zero at the supports. The effective prestress in wires is 800MPa. Permissible tensile stress in concrete is 4.5MPa. Estimate the ultimate shear resistance of the section, assuming failure to take place when principal tensile stress reaches a value equal to the tensile strength of concrete

b Calculate the efficiency of the sections: 08

1) I –section top flange: 400x200mm bottom flange : 200x200mm web :100x600mm. overall depth = 1000mm
2) Tee-section : flange 600x250mm web 750x100mm overall depth =1000mm

[TURN OVER

Q 4		A prestressed concrete beam of rectangular section is 120x250mm deep of span 6m. The beam is provided with a straight tendon at a uniform eccentricity of 45mm, the prestressing force is 200kN. Find the deflection at the centre. a) due to prestressing force and dead load. b) due to prestressing force, dead load and live load 4kN/m. c) Cracking load. d) 1.5times the working load Consider creep and shrinkage creep coefficient =1.7. E_c=35GPa and Concrete Density =24kN/m^3, modular ratio = 6.0. f_{cr} = 4Mpa. Is the deflection within the permissible limit for the case b?	20
Q 5		A post-tensioned prestressed concrete beam of span 10m is subjected to a prestressing force of 2000kN at transfer. The parabolic cable profile has an eccentricity of 150mm at centre of the span . The beam section is 350x800mm. Area of tendon is 2100mm^2 E_s=200GPa E_c=30GPa. μ=0.55, k=.0015 per meter. Relaxation of steel is 2%. Determine the total loss in the section considering creep and shrinkage (after 8 days) also. Find also the effect of Live Load of 25kN/m on losses.	20
Q 6	a	A post tensioned prestressed concrete Tee-beam with unbonded tendons has flange width= 300mm and 150mm depth. The web thickness is 150mm and effective depth is 320mm.The beam is prestressed by 24 wires H.T. wires of 5mm diameter with an initial stress of 65% of the ultimate tensile strength of wires. L/d=20 f_{ck}=56MPa f_p=1650MPa Loss ratio =0.8. Estimate the flexural strength of the section as per IS-1343	10
	b	A prestressed concrete T-beam supports an imposed load of 4.4kN/m over an effective span of 5m. The flange is 400x40mm and web is 100x200mm overall depth is 240mm.Check the adequacy of the section provided if the permissible tensile stress in concrete is zero and permissible compressive stress in concrete is 15MPa.Calculate the minimum prestressing force necessary and corresponding eccentricity	10
Q 7	a	Explain the concordant cable.	05
	b	A prestressed concrete continuous beam ABC (AB=BC=10m) has a uniform rectangular cross section 100mmx300mm(depth).A cable carrying an effective prestressing force of 350 kN varies linearly with an eccentricity of 50mm towards the soffit at end support and 50mm towards the top of the beam at mid support B. a) Determine the resultant moment at B due to prestressing only. b) If the eccentricity of the cable at B is 25mm towards the top show that the cable is concordant. c) If the cable profile is parabolic with zero eccentricity at A and C and 50mm toward the support at B. Will the cable be concordant?	15

Con. 3108–10.

May 2010

IE

(3 Hours)

AN–2635

[Total Marks : 100

N.B.: (1) Question No.1 is compulsory.
(2) Solve any four questions from remaining.
(3) Assume suitable data wherever required.
(4) Draw neat and clean sketches whenever required

1 a) Enlist the methods of irrigation and explain any three in detail. (10)

b) A water course has culturable commanded area 1200 hectares. The intensity of irrigation for Kharif crop A is 40 % and for Kharif crop B is 45 %. Crop A has a kor period of 15 days and crop B has kor period of 20 days. Calculate the discharge of water course if the kor depths for crop A and crop B are 25 cm and 30 cm respectively. (10)

2 a) What are different types of precipitations? Explain any two. (06)

b) Write note on Symon's Rain Gauge. (04)

c) The hourly ordinates of two hour unit hydrograph are as given below. Derive 6 hour unit hydrograph for the same catchments. (10)

Time (Hrs)	0	1	2	3	4	5	6	7	8	9	10
Discharge(Cumecs)	0.0	1.8	4.5	5	7.5	8	6	4.2	2.5	1.3	0.0

3 a) A tube well fully penetrates a confined aquifer of thickness 30 m and coefficient of permeability 38 m/day. Determine the radius of well if yield required is 50 lit/sec under a drawdown of 4 m. Use radius of circle of influence as recommended by Scardi. (10)

b) Explain recuperation test. (05)

c) Explain with sketch interference among wells (05)

4 a) Explain what is pore pressure and its role during and after construction of earthen dam. (10)

b) Design an irrigation channel to carry a discharge of 38 cumec. Take N = 0.0225 and critical velocity ratio as 1. The channel bed slope is 0.17 meters per kilometer. (10)

5 a) List methods of design of gravity dam. Explain gravity method in detail. (10)

b) What is water logging with relevance to canal? Why canal lining is necessary, explain any two types of canal lining? (10)

6 a) Explain Bligh's creep theory along with design criteria. (10)

b) Explain design method of Sarda Fall with neat sketch. (10)

7 Write short note on :- (20)

a) Arch dam
b) Bandhara Irrigation
c) Canal falls
d) Factors affecting runoff.

(a) Sheep foot roller
(b) Ready Mixed Concrete
(c) Needle Beam method
(d) Tunnel Boring machine
(e) Tower Crane
(f) Concreting in hot weather

1425-10. AN–2629

May 2010 (R) EG – II (3 Hours) [Total Marks : 100

(1) Question No. 1 is compulsory.
(2) Attempt any four questions out of remaining six questions.
(3) Assume suitable data wherever necessary but state the same clearly.

1) Answer any six :— 12
(i) What are the functions of aerators in activated sludge process ?
(ii) Define 'Effective Size' and 'Uniformity Coefficients'.
(iii) How chlorine as a disinfectant is sensitive to pH ?
(iv) What is the principle of tube settler ?
(v) What is sludge Volume Index ? What is F/M ratio ?
(vi) Why sludge dewatering is important ?
(vii) What is 'Sludge bulking' and 'Rising of sludge' ?
(viii) Why oil and grease should be removed from waste water ?

2) Draw a flow sheet of conventional sewage treatment plant. What is the approximate amount of BOD reduced at each stage ? 8

3) A circular settling tank 22mt diameter and 4·0 mt side water depth is designed to treat 15000 m^3/day of flocculated water. Check the design with respect to detention time, weir loading and surface loading. 5

4) Compare Ion Exchange Process and Lime Soda Process of water softening. 5

5) Explain the steps involved into design of paddle flocculator 5

6) Explain Coagulant Aids briefly. 5

7) Design a single stage trickling filter with following data :— 10

Sewage flow	—	6000 m^3/day
Raw Sewage BOD_5	—	270 mg/lit
Recirculation ratio	—	2
Organic loading rate	—	1 kg/m^3/day
BOD_5 of effluent desired	—	30 mg/lit

Check hydraulic loading rate and find the efficiency of filter.

8) Give a brief description of several disinfectants used in water treatment stating the relative merits and situations where they are most suited. 10

9) Explain the physical, chemical and biological characteristics of water. Write the standards for potable water. 12

10) A sample of sewage shows 5 days 20°C BOD value of 300mg/lit. What is the BOD exerted in 8 days if reaction is carried out at 30°C K_{10} = 0·1 / day. 8

11) Explain the different types of stabilisation ponds including aerated lagoon with sketches. 10

12) Design a septic tank for housing colony of 200 people with water supply rate of 135 lit per capita per day. If BOD_5 of raw sewage is 200 mg/lit and the tank is to be cleaned once in two years. 6

13) Explain Imhoff tank. 4

14) Explain the following terms related to activated sludge process: 6
(i) Mixed Liquor suspended solids
(ii) Aeration
(iii) Hydraulic Retention time.

15) Explain self purification of stream. 4

16) Explain Oxygen Sag Curve. 5

17) Discuss briefly the mechanism of coagulation and flocculation 5

Write short notes on any four :— 20
(a) Reverse Osmosis
(b) COD and its significance
(c) Short Circuiting
(d) Population forecasting
(e) Sewage Disposal
(f) Grit Chamber.