

BE & CE
Sem VII
Prestressed Concrete

15-12-2014

QP Code : 15554

(3 Hours)

[Total Marks : 100

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

1. Attempt the following :-

- (a) What is end zone ? Discuss the stress distribution in the end zone. 5
(b) State and explain principal of prestressing. What is difference between transfer and service stage. 5
(c) Define term efficiency factor of a prestressed concrete section and calculate its value for a circular section. 5
(d) Explain why high strength concrete and steel is required in case of prestressed concrete. 5

2. (a) Enlist various types of losses occurred in pre-tensioned and post-tensioned prestressed concrete members. 4
(b) A prestressed concrete beam 250×500 mm in cross-section is prestressed with cables of area 300 mm^2 at a constant eccentricity of 50 mm subjected to initial stress of 1100 N/mm^2 . The beam is simply supported over a span of 8 m. Calculate the percentage loss in steel stress if;
(i) The beam is post-tensioned
(ii) The beam is pre-tensioned.

Use following data :-

$$E_s = 200 \text{ GPa}, E_c = 34 \text{ GPa},$$

$$\text{Anchorage slip} = 2 \text{ mm}$$

$$\text{Creep coefficient} = 1.6, \text{ friction coefficient for wave effect} = 0.0016/\text{m}.$$

$$\text{Relaxation of steel stress is } 6\% \text{ of initial stress.}$$

3. An unsymmetrical I-beam section, is used as a simply supported beam over a span 20 of 10 m. The beam has following details :-

$$\text{Top flange} = 300 \text{ mm} \times 60 \text{ mm}$$

$$\text{Bottom flange} = 150 \times 80 \text{ mm}$$

$$\text{Overall depth} = 1200 \text{ mm}$$

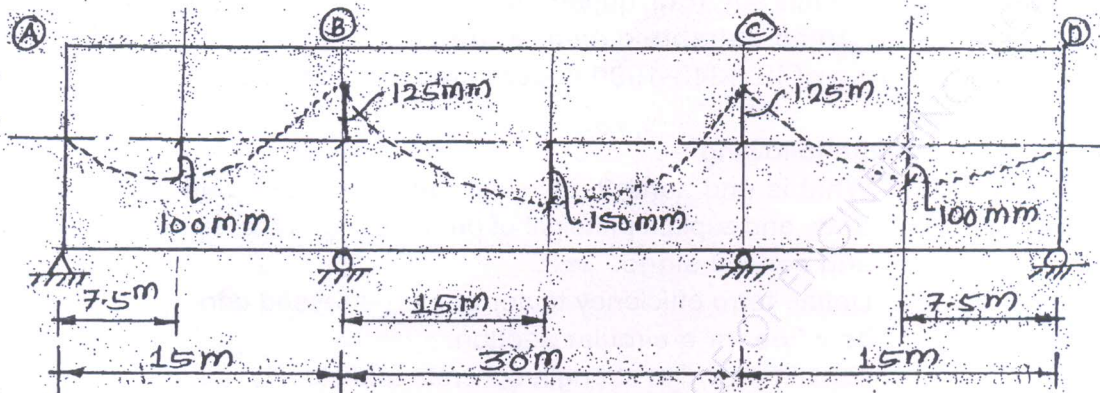
$$\text{Web thickness} = 100 \text{ mm}$$

Determine the maximum stresses in concrete at mid span, quarter span and at support section at transfer and service stage. The beam is carrying an imposed load of 25 kN/m . It is prestressed with 4-HT wires of 7 mm diameter which are straight and located at 50 mm above the beam soffit. The wires are initially stressed to 1100 N/mm^2 . Assume 20% loss in prestressing at service condition.

LM-Con. : 11559-14.

[TURN OVER

4. Estimate the equivalent upward load and hence locate the pressure line. Is it concordant cable? If not, make it concordant by linear transformation. The beam is symmetrically prestressed by a parabolic cable carrying 2600 kN prestressing force. The beam is as shown in figure below. 20



5. (a) Explain with neat sketch any one system of post tensioning anchorage. 5
 (b) A prestressed concrete beam of span 8 m and c/s 250 mm × 450 mm is axially prestressed by a cable carrying an effective force of 350 kN. The beam supports udl of 10 kN/m inclusive of its self weight. Compute the magnitude of tension developed in the beam with and without the axial prestress. 10
 (c) Explain with neat sketch load balancing concept in detail. 5
6. (a) State the advantage of continuous prestressed concrete member. Also discuss the different concepts to achieve the continuity. 4
 (b) A simply supported post tensioned concrete beam of rectangular section 300 mm wide is to be designed for an imposed load of 15 kN over the span of 10 m. If the stresses in concrete is not to exceed 16 N/mm² in compression or 1.5 N/mm² in tension at any stage. Calculate : 16
 (i) Minimum possible depth of section.
 (ii) Minimum prestressing force and corresponding eccentricity for designed depth. Assume 20% loss in prestress.
7. (a) The end block of a post-tensioned beam is 100 mm × 200 mm. A prestressed wire 7 mm in diameter, stressed to 1200 N/mm² has to be anchored against the end block at the centre. The anchorage plate is 50 mm × 50 mm. The wire bears on the plate through female cone of 20 mm diam. Find the suitable thickness of anchorage plate if the permissible stress in concrete at transfer = 20 N/mm² and permissible shear stress in steel = 94 N/mm². 10
 (b) Write short note on :-
 (i) Short time and long time deflection. 5
 (ii) Importance of safe cable zone (Derive the equation for vertical limit for safe cable zone). 5

(3 Hours)

[Total Marks :100

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

1. Answer any **four** :—

20

- (a) An aeration tank has a MLSS concentration of 2900 mg/L. After settling for 30 minutes in one litre of graduated cylinder, the sludge is measured to be 180 ml. Calculate the SVI of the sludge. Indicate whether the volume index is good or poor.
 (b) Explain causes and effects of air pollution.
 (c) Name the two factors used as criteria for selection of pipe diameter and slope in design of sewer.
 (d) Define Noise and explain its effects and control measures.
 (e) Define sludge. What are the factors controlling digestion?

2. (a) What are traps, and why are they provided? How can the water seal in traps be broken? What methods are to be employed to maintain the seal? 10
 (b) Explain the principle and operation of an oxidation ditch. List its merits and demerits. 10

3. (a) What are the criteria to be used in deciding the material for sewer pipes? 10
 (b) Differentiate between aerobic and anaerobic treatment of sewage giving major end products. Name one treatment method in each category. 10

4. (a) Calculate the discharge of 1.5 m circular sewer laid at a slope of 1 in 380, when it is running half full. Assume n in Manning's formula as 0.012. 10
 (b) Draw a flow diagram of sewage treatment plant for a medium sized town. 10

5. (a) Design a septic tank for a small colony of 500 persons with average daily sewage flow of 80 litres per head. Detention period is 24 hours. Cleaning interval is 6 months. Draw a neat sectional sketch showing all details. 12
 (b) Discuss the stages of biological action constituting sludge digestion. 8

6. (a) State the merits and demerits of combined system and separate system. 8
 (b) Determine the size of a high rate trickling filter for the following data
 Sewage flow = 8.5 MLD Recirculation ratio = 1.3 BOD of raw sewage = 260 mg/l 12
 BOD removal in Primary tank = 30% final effluent BOD desired = 30 mg/l

7. (a) Explain the operational problems in ASP and Trickling filter 10
 (b) Explain factors affecting self purification of stream. 10

BE-Civil (VII-REV)

QSEV

09/12/2014

QP Code :15478

(Revised Course)

(100 Marks)

(4 Hours)

- 1) Question No 1 is compulsory.
- (2) Attempt any four questions out of remaining six questions.
- (3) Assume suitable data if required and specify the same clearly.
- (4) Figures to the right indicate full marks.

Q.1) Work out the quantities of the following items of work by referring Plan & Section Shown in Fig.1. ---20M.

- (a) P.C.C (1:2:4) in foundation.
- (b) Ist Class brickwork in foundation in C.M (1:4).
- (c) 2.5 cm thick D.P.C (1:3:6).
- (d) 12 mm.thick internal plaster in C.M (1;5)

- Q.2)
- a) Prepare an approximate estimate for (G+4) R.C.C building. Bldg.consist of six flats On each floor & each flat has carpet area of 110 m².Assume area occupied by walls & columns etc.as 10% of built up area & area of circulation as 20% of built up Area. Assume cost of construction as Rs.10000/m². ----10 M.
 - b) Prepare abstract of cost for the items in Q.no.1. ----06 M.
 - c) What is Tender Notice? Mention main inclusions of it. ----04 M.

- Q.3)
- a) What is Contract? Explain the types of contract with their suitability. ---- 12 M.
 - b) Prepare rate analysis for Ist class brickwork in superstructure in C.M (1:4). ---- 08 M.

- Q.4)
- a) Work out the quantity of earthwork for a portion of a road. ---- 12 M.
 - 1) Top width of formation = 12 m.
 - 2) R.L of formation at zero chainage = 51.4 m.
 - 3) Falling Gradient = 1 in 200
 - 4) Side slope: - 1V: 2H (Banking) 1V: 1.5H (Cutting)

Chainage	0	30	60	90	120	150	180
R.L of Gr.(m)	50.8	50.6	50.7	51.2	51.4	51.3	51.0

- b) Explain: - ---- 08 M.
 - 1) Mass Haul Diagram.
 - 2) Prismoidal formula & Trapezoidal formula.

- Q.5)
- a) Explain:- ---- 12 M.
 - 1) Earnest Money Deposit & Security Deposit.
 - 2) Liquidated damages & unliquidated damages.
 - 3) Freehold properties & Leasehold Properties.
 - b) Explain Belting Method of valuation in detail. ---- 08 M.

Q.6)

a) A building is newly constructed with cost of Rs. 1 Crore over a plot of land costing Rs.70 Lacs. Building consists of 20 flats of area $120M^2$ each.

Work out monthly standard rent / flat from the following data;-

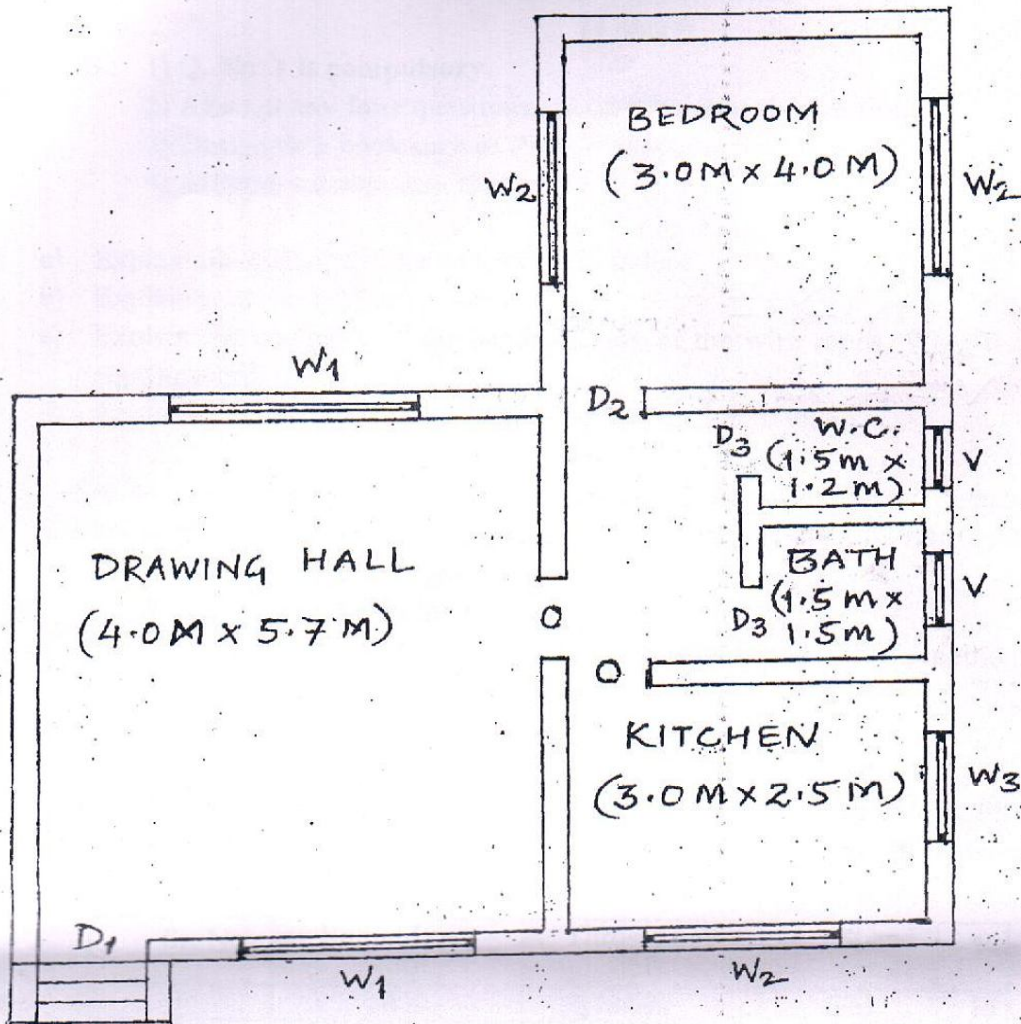
- 1) Expected net return from land & building = 7%.
 - 2) Rate of interest on Sinking fund = 9%
 - 3) Life of building = 60 years.
 - 4) Salvage value = 10% of cost of building.
 - 5) Repairs & maintenance cost = 7% of building cost.
 - 6) Taxes & other outgoings = 25% of gross rent. --- 10M.
- b) What is bar bending Schedule? Why it is prepared? --- 06 M.
 Explain clearly along with its profarma. --- 04 M.
- c) Explain:-
- 1) Pre-bid conference
 - 2) Debitable agency. --- 20 M.

Q.7) Write notes on following (any four)

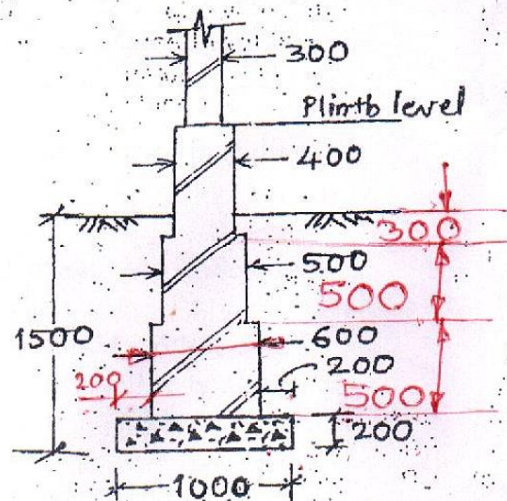
- a) Escalation clause
- b) C.B.R.I. method.
- c) I.S 1200
- d) Freehold properties & leasehold properties.
- e) Use of computers in Estimation process.

[TURN OVER

LM-Con.:10466-14.

Fig. no. 1

Wall Thickness \leftarrow 300mm.
 Plinth level --- 600mm.
 Floor to floor height --- 3000mm.
 Slab thickness --- 120mm.



* Schedule of openings :-

DOORS

D₁ — 1.1m x 2.1m.

D₂ — 1.0m. x 2.1m.

D₃ — 0.9m. x 2.1m.

O — 1.2m x 2.1m.

WINDOWS

W₁ — 2.0m x 1.3

W₂ — 1.8m. x 1.3m

W₃ — 1.5m. x 0.8m

V — 0.6m x 0.4

QP Code : 15342

(3 Hours)

[Total Marks : 100

- N.B. :** (1) Question No. 1 compulsory.
 (2) Solve any **four** questions from remaining.
 (3) Assume **suitable** data if **required**.

1. (a) Discuss in brief the benefits and ill effects of irrigation. 6
 (b) Write a note on sub-surface irrigation. 4
 (c) Explain any one type of automatic rain gauge. 6
 (d) What are causes of waterlogging. 4
2. (a) A field channel has culturable commanded area of 2000 hectares. The intensity of irrigation for gram is 30% and for wheat is 50%. Gram has a kor period of 18 days and kor depth of 12 cm, while wheat has a kor period of 15 days and kor depth of 15 cm. Calculate the discharge of the field channel. 8
 (b) Describe with the help of a diagram various forms of a soil moisture. What do you understand by the available moisture. 8
 (c) What do you understand by crop rotation. 4
3. (a) What is hydrograph ? Draw a single peaked hydrograph and explain its components. 8
 (b) What do you understand by unit hydrograph. 4
 (c) A 2 hr. unit hydrograph in a rather steep catchment is given below : 8

Time in (hr)	0	2	4	6	8	10	12
Discharge 100 m ³ /s	0	0.54	1.75	1.27	0.58	0.25	0

Compute the 1 hr. unit hydrograph for the catchment.

4. (a) Write notes on following :- 12
 (i) Well loss
 (ii) Aquifer
 (iii) Interference among wells
 (iv) Assumptions of Dupuits theory.
- (b) A 30 cm diameter well penetrates 25 m below the static water table. After 24 hours of pumping @ 5400 liters/minute, the water level in a test well at 90 m is lowered by 0.53 m, and in a well 30 m away the drawdown is 1.11 m. 8
 (i) What is the transmissibility of the aquifer.
 (ii) Also determine the draw down in the main well.

5. (a) Explain various types of reservoirs. What do you understand by multipurpose reservoir. 8
(b) Write a note on stability requirements of gravity dam. 8
(c) What do you understand by gravity dam ? Enlist various forces acting on it. 4
6. (a) What is (i) Buttress dam (ii) Arch dam. 6
(b) Discuss in brief the causes of failures of earth dams. 6
(c) What is spillway ? What are it's functions ? Enumerate various types of spillways. 8
7. (a) A 25 m high concrete dam having trapezoidal section has top width 2 m and bottom width 16 m. The base of dam exposed to water has a slope of 1:10. On the reservoir side water stands up to top. Assume weight of Concrete 2400 kg/m^3 coefficient of friction 0.75, allowable shear stress 5 kg/cm^2 . Consider weight of dam, water pressure and uplift pressure and check the stability of dam. 10
(b) Write a short note on :- 10
(i) Canal lining
(ii) Cross drainage works.

LM-Con. 8488-14.

BE - CE
Sem - VII
LSM RCS

03-12-2014

QP Code: 15401

(3 Hours)

(Total Marks: 100)

N.B: (1) Question No.1 is compulsory. Attempt any four questions out of remaining six questions.

- (2) Use of IS code is not permitted. Assume suitable data wherever required.
- (3) Illustrate your answers with neat component sketches wherever required.
- (4) Answers should be written in the legible handwriting, stepwise and in the systematic manner.

1. Attempt any four of the following

- (a) What do you mean by 'Limit State'? Explain its various types indicating its salient features along with merits. 05
- (b) Explain under, over and balanced section w.r.t Limit state method of RC design. 05
- (c) Derive design stress block parameters for singly R.C section for LSM of design. 05
- (d) When it is required to design a doubly reinforced beam section. Also Draw various forms of shear reinforcement provided in beam. 05
- (e) What are the functions served by longitudinal and transverse steel reinforcement in column, distribution steel in slab and stirrups in case of beam? 05

2. (a) Determine the maximum udl the beam can carry safely (including self weight), for RC section 230 mm × 550 mm depth overall and reinforced with 4-20 mm Φ . It is used as a simply supported beam over an effective span of 5.5m. Use M20/Fe 415. 08
- (b) Design a R.C beam of size 230 mm × 550 mm overall depth supported between an effective span of 6.0 m. It is subjected to a service load of 30 kN/m. Use M20 concrete and Fe 415 steel. 12

d'/d	0.05	0.10	0.15	0.2
f_{sc}	355.1	351.9	342.4	329.2

3. (a) Describe in brief concept of equivalent flange thickness for analysis and design of R.C. T section. 04
- (b) Find the ultimate moment of resistance of T beam section using Fe 415 steel grade and M20 concrete grade. 16

Width of flange = 800mm

Depth of the slab = 80 mm

Width of rib = 300 mm

Area of steel = 4 - 20 mm Φ on tension side

[TURNOVER

4. (a) (i) Derive the expression for development length. 03
(ii) Explain the difference in the behavior of one way slab and two way slab. 03
- (b) Design a S.S slab for a room of size 4.0m × 5.75m (internal). The slab panel is subjected to live load of 3.5 kN/m² and floor finish load 1.0 kN/m² apart from its self weight. Use Fe 415 steel and M20 grade concrete. Refer Table given below. 14

ly/lx	1.0	1.1	1.2	1.3	1.4	1.5	1.75
α_x	0.062	0.074	0.084	0.093	0.099	0.104	0.133
α_y	0.062	0.061	0.059	0.055	0.051	0.046	0.037

5. (a) Explain different types of footings provided under different condition. 04
- (b) Design the combined rectangular pad footing for two columns A and B carrying load of 800 kN and 1000 kN respectively. Column A is 400 mm square and B is 500 mm square in size and they placed at 4 m c/c. Assume width of footing as 1.5 m. and S.B.C of soil as 200 kN/m². Use M20/Fe415. Also draw a neat sketch showing reinforcement details. 16
6. (a) Explain different types of columns. 03
- (b) Write the steps to determine the design strength corresponding to limiting conditions of no tension in the column section, considering eccentricity of loading along any one axis. 04
- (c) Calculate ultimate L.C.C of short axially loaded R.C column of size 400 × 400 mm, if it is reinforced with 8 bars of 16 mm dia. as longitudinal reinforcement. Use M20/Fe415. 05
- (d) Design a short axially loaded square column to carry an axial load of 2250 kN. Use M20 concrete and Fe 415 steel. Adopt LSM. Also design links and draw reinforcement details. 08
7. (a) Determine ultimate moment of resistance for a singly reinforced rectangular beam of width 300 mm and 450 mm effective depth. The tension reinforcement consists of 4 – 16 mm dia. Take $\sigma_{cu} = 20 \text{ N/mm}^2$ and $\sigma_{sy} = 420 \text{ N/mm}^2$. Use ULM. 10
- (b) Design the shear reinforcement for the rectangular beam of dimension 300 × 500 mm (effective) provided with 4 – 20 mm dia. In tension zone. The beam is subjected to UDL of 50 kN/m over the span of 7 m. Use M20 concrete and Fe 415 steel. Adopt LSM. 10

$p_t \%$	0.25	0.50	0.75	1.00	1.25	1.50	1.75	2.00	2.25
$\tau_c (\text{N/mm}^2)$	0.36	0.48	0.56	0.62	0.67	0.72	0.75	0.79	0.81

Course : B.E (CIVIL & CONSTRUCTION) (SEM VII)
Q.P Code : 15401
Correction :

Correction/additional data in Q.3. (b) Assume overall depth of beam = 450 mm with an effective cover 50 mm. Assume additional data if require and mention the same.

Query Update time : 03/12/2014 11:35 am

Block No:- 1 PATEL IFTKHAR Patel

1) Khan Manz Ahmed 68501273

Block No:- 2 S. V. Hule Shreedha

1) Pathan Altamash
seat no- 68501285