

AIKTC/KRRC/SoET/ACKN/QUES/2017-18/

Date: _____

School: SoET-CBSGS Branch: CIVIL ENGG. SEM: VII

To,
Exam Controller,
AIKTC, New Panvel.

Dear Sir/Madam,

Received with thanks the following Semester/Unit Test-I/Unit Test-II (Reg./ATKT) question papers from your exam cell:

Sr. No.	Subject Name	Subject Code	Format		No. of Copies
			SC	HC	
1	Limit State Method for Reinforced Concrete Structures	CE-C701			
2	Quantity Survey Estimation and Valuation	CE-C702			
3	Irrigation Engineering	CE-C703			
4	Environmental Engineering – II	CE-C704			
5	Elective – I	CE-E705			
6					

Note: SC – Softcopy, HC - Hardcopy

(Shaheen Ansari)
Librarian, AIKTC

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BE-sem-VII - Civil - CBGS - LSMRCB

11/05/18

Q. P. Code: 16462

(CBGS)

[3hrs]

[80 marks]

- N. B. (1) Question No. 1 is compulsory.
(2) Solve any **three** questions from remaining questions.
(3) Assume suitable data wherever required and state them clearly.
(4) Use of IS 456 not permitted.

1. (a) What are partial safety factors for load and material strength? What is their significance in limit state method of design? 5
(b) What do you mean by under reinforced, over reinforced and balanced section? 5
(c) What are the functions of longitudinal and transverse reinforcement in columns? 5
(d) Explain the concept of equivalent flange thickness for analysis and design of T beams 5
2. (a) A singly reinforced rectangular beam with width 230 mm and effective depth 450 mm is reinforced with 5 bars of 16 mm diameter. Calculate the ultimate moment of resistance of the section using limit state method. Grade of concrete M 20 and steel Fe 500. 6
(b) A reinforced concrete beam 230 mm x 600 mm overall depth reinforced with 4 bars of 20 mm diameter is used as a simply supported beam over an effective span of 5 m. Determine the maximum udl the beam can carry safely (including self weight). Adopt M 20 grade of concrete and Fe 415 steel. 10
(c) Derive values of limiting depth of Neutral axis for grades of steel Fe 415 and Fe 500 4
3. (a) A rectangular R.C. beam is 230 mm x 530 mm deep. It is reinforced with 5 bars of 20 mm diameter on tension side and 3 bars of 16 mm diameter on compression side at an effective cover of 50 mm for both the steels. Calculate ultimate moment of resistance of the section if grade of concrete is M20 and grade of steel is Fe 415. 10

d' / d	0.05	0.1	0.15	0.2
f_{sc} (N/mm ²)	355.1	351.9	342.4	329.2

Turn Over

Q. P. Code: 16462

- (b) A rectangular R.C beam is 300mm x 400 mm deep is subjected to an ultimate torsional moment of 30kNm, ultimate BM of 45kNm and ultimate shear force of 38kN. Adopt grade of concrete M 20 and grade of steel Fe 415. Assume effective cover to tension and compression reinforcement as 40mm. Design the beam. 10

p_t	0.25	0.50	0.75	1.0	1.25	1.50	1.75	2.00
τ_c	0.36	0.48	0.56	0.62	0.67	0.72	0.75	0.79

4. (a) Design a slab on a hall of size 3 m x 5 m effective. The slab is simply supported on 230 mm wall on all four sides. Consider LL 4 kN/m² and floor finish 1 kN/m². Assume M 20 grade of concrete and Fe 415 steel 12

L_y/L_x	1.1	1.2	1.3	1.4	1.5	1.75	2.0
α_x	0.074	0.084	0.093	0.099	0.104	0.113	0.118
α_y	0.061	0.059	0.055	0.051	0.046	0.037	0.029

- b) Determine the ultimate moment of resistance of a T beam section using Fe 415 grade steel and M20 concrete grade. 8

Width of flange = 800mm
 Depth of slab = 80mm
 Width of rib = 300mm
 Area of steel = 4- 20 mm ϕ on tension side

5. (a) Draw Whitney's Stress block and hence determine the ultimate moment of resistance of a beam 300 mm wide and 500mm deep considering it as a balanced section. Take $\sigma_{cu} = 20$ N/mm² and $\sigma_{sy} = 425$ N/mm². 6

- (b) A R.C. beam 250 mm x 450 mm effective depth is subjected to an ultimate moment of resistance of 225 kN-m. Calculate the steel reinforcement required for the beam. Assume $\sigma_{cu} = 20$ N/mm² and $\sigma_{sy} = 425$ N/mm². Use Ultimate Load Method. 10

- (c) State the situations where doubly reinforced beams are necessary? 4

6. (a) A rectangular column of dimensions 250 mm x 500 mm is subjected to an ultimate axial load of 1200kN. Design an isolated footing for the column assuming safe bearing capacity of soil to be 210 kN/m². Adopt grade of concrete M 20 and grade of steel Fe 415. 12

- (b) Design a short square column subjected to a factored load of 2000kN. Adopt grade of concrete M 20 and steel Fe 415. 8

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BE-sem-VII - CBSAS - CIVIL - OBE V

17/5/18

Q.P. Code: 25324

Time: (4 Hours)

Marks: 80

- (1) Question No 1 is compulsory.
- (2) Attempt any three questions out of remaining five questions.
- (3) Figures to the right indicate full marks.
- (4) Neat illustrations and legible handwriting will be appreciated.
- (5) Answer should be brief and to the point.
- (6) Assume suitable data if required and specify the same clearly.

Q.1) Work out the quantities from given plan and section in figure (1) 20M.

- a) UCR masonry in cement mortar 1:2 in foundation up to plinth.
- b) First class brick masonry in cement mortar 1:3 in superstructure (including plinth steps)
- c) External plastering 25 mm thick in two coats in C.M (1:4) adding water proofing compound. (Including plinth steps)
- d) Prepare an abstract of cost for the items of works specified above.

Q 2)

- a) Prepare rate analysis for M20 R.C.C concrete with 1% steel including centering and shuttering. 8M
- b) Draft a tender notice for construction of hospital building by CIDCO Navi Mumbai (Executive Engg) with an estimated cost of Rs one crore and duration of project is 24 months. 8M.
- c) Differentiate between void and voidable contract. 4M.

Q 3)

- a) Prepare approximate estimate for G+6 R.C.C residential building consisting of four flats per floor and each flat has a carpet area of 80 sq mt. Assume area occupied by walls and columns etc as 8.5 % of built up area and area of circulation as 25% of built up area. Assume cost of construction of superstructure as Rs 10,000/- per sq mt. Assume suitable percentages for services, contingencies and work establishment charges. 8M.

- b) Explain the different types of specifications for items of construction work? Also explain the various principles of specification writing. 8M.
- c) What is pre-bid conference and pre-qualification of tenderer? 4M.

Q 4)

- a) Calculate the quantity of earthwork in cutting and in banking for the portion of road with the following data.

GL	120.5	120.10	119.7	119.2	118.5	118.2	117.7	117.3	117.5
Chai n age	0 (A)	1	2	3	4	5	6	7	8 (B)

The road is uniform down gradient from point 'A' with formation level of 118.90, to a point 'B' with formation level of 118.10. Distance between two points is 320 meters. The formation width in cutting is 5.5 meters and in banking is 6.0 meters. Side slope in cutting is 1.5:1 and in banking is 2:1. Estimate the cost of earthwork by considering existing District Schedule Rates. 10M.

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- b) Differentiate between :- 10M.
i) Price Escalation and Price variation. ii) BOT and BOOT contract
iii) Rules for deduction in plastering as per IS 1200
iv) Work Charged Establishments and Contingencies.

Q 5) a)

Work out the quantity of steel in a 7.0 meter long simply supported beam of size 300x700 mm overall. Bottom bar: 4 – 20 mm. diameter out of which two bars are bent up at 45 degree at supports. Anchor bar: 2–12mm diameter, stirrups 8mm diameter @ 200 mm c/c throughout the length of the beam. Refer figure 2. 10M.

b) Write short notes on:- 10M.

- i) Termination of contract. ii) Retention Money.
iii) Defect liability period. iv) Extension of contract period.

Q6)

a) A newly constructed building cost Rs 70 lakhs on a plot of valuation Rs 100 lakhs. Ten Flats of 120 sq mt each are constructed. Fix the monthly rent per flat from the following data.

- i) Net return on land and building = 10%.
ii) Life of building = 50 years.
iii) Interest rate on Sinking Fund = 6%.
iv) Salvage Value = 10% of cost of building.
v) Repairs and Maintenance = 3% of building cost.
vi) Taxes and other expenses = 20 % of Gross rent. 10M.

b) Write short notes on 10M.

- i) Advances to contractor ii) Settlement of disputes
iii) Economic haul distance iv) Easement Rights.

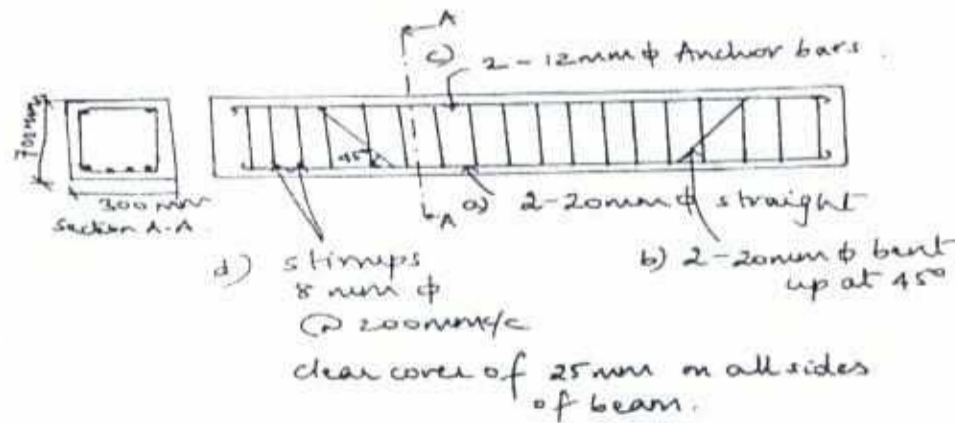


Figure 2.

Q.P. Code: 25324

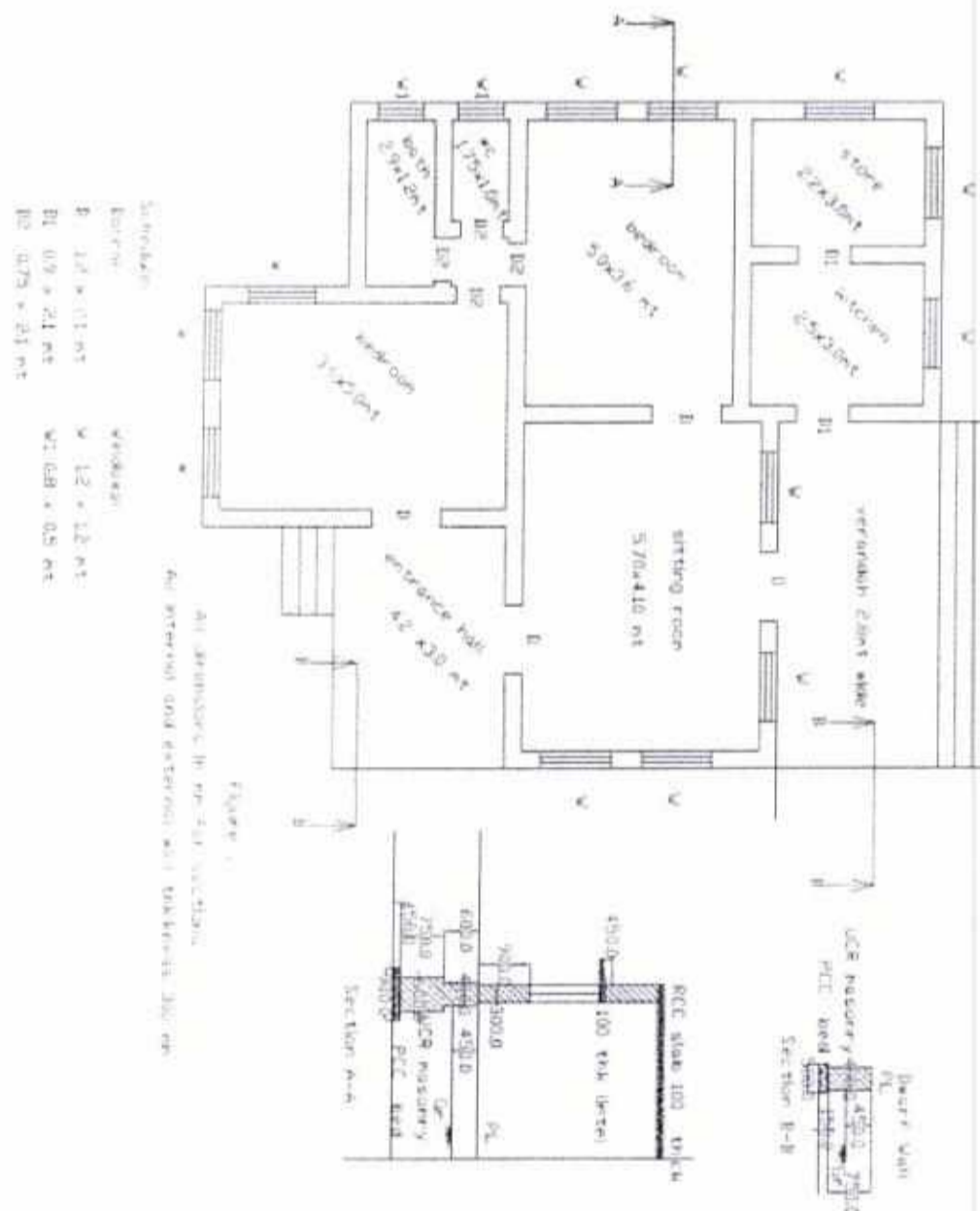


Figure 2.

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B.E - Civil - Sem - VII - OBSQS - IE

29/5/18

Q.P.Code:13406

(3 hours)

Max. Marks: 80

Note: (1) Question no.1 is compulsory
 (2) Solve any 3 questions out of remaining
 (3) Assume data wherever necessary and clearly mention the assumptions made.
 (4) Draw neat figures as required.

- Q1 Answer any four out of the following** 20
- a Discuss in brief various methods of surface irrigation. 05
 - b Define Duty, delta and Base period. Derive the relationship between them. 05
 - c What is hydrograph? Draw a single peaked hydrograph and explain its components. 05
 - d Explain the terms 'storage coefficient' and 'coefficient of permeability'. 05
 - e What are the factors on which the selection of site of reservoir depends? 05
 - f Give the detail classification of Dams 05

- Q2 a** After how many days will you supply water to soil in order to ensure efficient irrigation of the given crop, if 07
- (i) Field Capacity of soil = 27%
 - (ii) Permanent wilting point = 14%
 - (iii) Dry density of soil = 15 kN/m³
 - (iv) Effective depth of root zone = 75 cm
 - (v) Daily consumptive use of water for the given crop = 11 mm
- b** The CCA of area of watercourse is 1200 ha. Intensities of sugarcane and wheat crops are 20% and 40% respectively the duties for the crops at the head of the watercourse are 730 ha/cumecs and 1800 ha/cumecs respectively. Calculate the Discharge at the water course. 07
- c** What is the importance of duty? Explain the variation of duty with the place of its measurement 06

- Q3 a** Discuss the various method of computing average rainfall over a basin 08
- b** A catchment has five rain gauge stations. In a year, the annual rainfalls recorded by the gauges are 78.8 cm, 90.2 cm 98.6 cm, 102.4 cm and 70.4 cm. For a 6% error in the estimation of the mean rainfall, determine the additional number of gauges needed 04
- c** Using the 3 hr unit hydrograph given below, find the peak flow, resulting from four successive 3 hr periods of rainfall producing 0.35, 0.87, 1.39 and 0.77 cm of runoff respectively from a basin. 08

Time (hr)	0	1	2	3	4	5	6	7	8	9	10	11	12	13
Flow (m ³ /s)	0	16	58	173	337	440	400	285	215	165	122	90	60	35

Time (hr)	14	15
Flow (m ³ /s)	16	0

Neglect base flow

TURN OVER

Q.P.Code:13406

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- Q4 a** Derive an expression for discharge from a well fully penetrating an unconfined aquifer. 07
- b** During a recuperation test, the water in an open well was depressed by pumping by 2.5 m and it is recuperated 1.8 m in 80 minutes. Find (a) yield from a well of 4 m diameter under a depression head of 3 meters, (b) the diameter of well to yield 8 lit/sec under a depression head of 2 m. 05
- c** What is reservoir sedimentation? What are the methods to control it 08
- Q5 a** Write a short note on storage zones of reservoir and control levels 06
- b** What are the modes of failure of gravity dam 07
- C** Write a short note on practical profile of gravity dam 07
- Q6 a** What are the causes of failure of earthen dam 10
- b** Write a short note on following; 10
1. Cross Drainage Works.
 2. Arch dam and Buttress Dam.
-

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BE- sem- VTI - CBSAS- Civil- EE- II

29/5/1

Q. P. Code : 40174

(3 Hours)

(Total Marks: 80)

- N.B:** (1) Question no. 1 is compulsory.
(2) Attempt any three questions out of five questions.
(3) Assume suitable data wherever required and state it clearly.

1. Attempt any four of the following 20
- (a) What is sludge volume index? What is its significance?
 - (b) Why velocity needs to be controlled in grit chamber?
 - (c) Draw a neat sketch of traps according to shapes.
 - (d) Difference between self purification of streams and self cleansing velocity.
 - (e) Explain the importance of BOD /COD ratio.

2. (a) An average operating data for conventional activated sludge treatment plant is as follows : 10

Waste water flow = 35000 m³/day

Volume of aeration tank = 10900 m³

Influent BOD = 250 mg/l

Effluent BOD = 20 mg/l

Mixed liquor suspended solids (MLSS) = 2500 mg/L

Effluent suspended solids = 30 mg/l

Waste sludge suspended solids = 9700 mg/l

Quality of waste sludge = 220 m³/d

Based on the information above, determine :

- i) Aeration period (hours)
 - ii) Food to microorganisms ratio (F/M) (kg BOD per day/kg MLSS)
 - iii) Percentage efficiency of BOD removal
 - iv) Sludge age
- (b) Explain with a neat sketch the working of trickling filter. What is the principle on which it works? 10

Q. P. Code : 40174

3. (a) Design the dimensions of a septic tank for the following data: **10**
No. of people =200
Sewage /capita/day =120 lit
Desludging period = 1 year
Length :width = 4:1
- (b) Differentiate between one pipe and single stack plumbing system with neat sketch. **10**
4. (a) Define BOD. Calculate 3 days 36°C BOD of sewage sample whose 5 days 20°C BOD is 200 mg/lit. Assume KD at 20°C as 0.1. **10**
- (b) Enlist different types of aerobic and anaerobic treatment methods. Compare oxidation pond and oxidation ditch. **10**
5. (a) Design a sewer to serve a population of 35,000; the daily per capita water supply allowance being 160 liters, of which 80 percent finds its way into the sewer. The slope available for the sewer to be laid is 1 in 600 and the sewer should be designed to carry four times the dry weather flow when running full. What would be the velocity of flow in the sewer when running full? **10**
- (b) Write a note on sludge dewatering and sketch sludge drying bed. **10**
6. Write short notes on following: **20**
- (a) Aerated lagoon
- (b) Sewage pumping station
- (c) Air pollution caused by automobiles and its control
- (d) Noise pollution and control
- (e) Sampling of sewage

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BE - Sem-VII - CBSGS - CIVIL - PC

4/6/18

Q.P.Code:50867

(Duration:3Hours) MaximumMarks: 80

- Note: 1) Q1 is compulsory. Attempt any three out of remaining five questions.
2) Use of IS 1343:2012 is permitted in the examination.
3) Assume suitable data if required and mention it clearly.
4) Support answers and solutions with suitable sketches.

- Q1. A] Develop the expression for ultimate shear strength/resistance of prestressed concrete section when un-cracked in flexure. [05]
B] Develop the expression for minimum sectional modulus of prestressed concrete section to be provided such that it is safe in limit state of serviceability cracking. [05]
C] Why flanged sections are preferred in prestressed concrete construction? Also explain why efficiency of rectangular section is always $33\frac{1}{3}\%$? [05]
D] What are the various reasons for failure of prestressed element in flexure? [05]

Q2. A] A beam 500mm wide and 750mm deep is prestressed by a parabolic cable having an eccentricity of 200mm below neutral axis at the centre of the span and 200mm above neutral axis at the end supports. The effective PF in the cable is 1600kN. If the simply supported beam of span 8m carries a total uniformly distributed load of 80kN/m which includes the self weight, evaluate the extreme fibre stresses at service stage at the mid span section using internal resistance couple method. [05]

B] A concrete beam of rectangular cross section 200mm wide and 600mm deep is prestressed by a cable located at an eccentricity of 100mm at mid span and zero at supports. The span is 10m and live load is 4kN/m. Suggest suitable cable profile and effective force necessary for zero principal tensile stresses throughout the span. [05]

C] A post tensioned beam of rectangular cross section 200mm wide and 400mm deep is 10m long and carries an applied load of 8kN/m uniformly distributed on the beam. The effective prestressing force in the cable is 500kN. The cable is parabolic with zero eccentricity at the ends and maximum of 140mm at the centre of the span. Determine the spacing of 2mm ϕ vertical prestressing wires initially stressed to 1200MPa, to eliminate principal tensile stresses completely at support. [05]

Q.P.Code:50867

D] A concrete beam of rectangular cross section 500mmx1000mm deep is continuous over two spans AB=BC=10m. The beam is prestressed by a cable carrying 4000kN. The cable is parabolic and concentric at supports A, B and C and has eccentricity 100mm at the centre of spans AB and BC. If the beam supports a live load of 20kN/m through out the spans A-B-C, Replace cable by equivalent load and estimate the extreme fibre stresses develop at central support section due to combined effect of prestressing force, dead load and imposed load. Take $\gamma_c=24 \text{ kN/m}^3$. **[05]**

Q3. A] The end block of a post tensioned prestressed concrete bridge girder is of rectangular section 450mmx1350mm. Three anchorages spaced at 450mm c/c are of 225mmx225mm and used to transfer PF of 4000kN each. Verify safety of end block against punching of plates also design anchorage zone reinforcement. Use M50 concrete with $f_{ck}=30\text{MPa}$ and Fe415 steel. **[10]**

B] A continuous beam A-B-C has spans AB=10m and BC=10m. It is prestressed by a single cable which has eccentricity of 200mm below neutral axis at supports A and C, and 200mm towards top at central support B. Cable is linear between AB and BC. Draw pressure line along the span due to prestressing force alone mentioning ordinate at supports A, B, C and at mid of spans AB & BC. Take PF=1250kN. **[10]**

Q4. A symmetric I-section with flange width and depth 200mm and 60mm respectively, has thickness of web 75mm and over all depth as 400mm is prestressed by a PF 980kN with $f_p=1200\text{MPa}$. Span is 4m. Parabolic cable coincides with the junction of web and flange at mid span and it is at 200mm from soffit of beam at support. Take $E_c=38\text{kN/mm}^2$ and $E_s=200\text{kN/mm}^2$

i. Determine initial deflection. Is it within permissible limit? If not, make suitable change in PF to restrict the deflection.

ii. If M50 grade concrete is used calculate deflection at when beam supports a total uniformly distributed load which is 1.5 times of load corresponding to first flexural tensile crack appears at mid span soffit. **[20]**

Q5. A] A 800mm wide 250mm deep simply supported bridge deck slab panel is designed as type 1 element has following specifications:

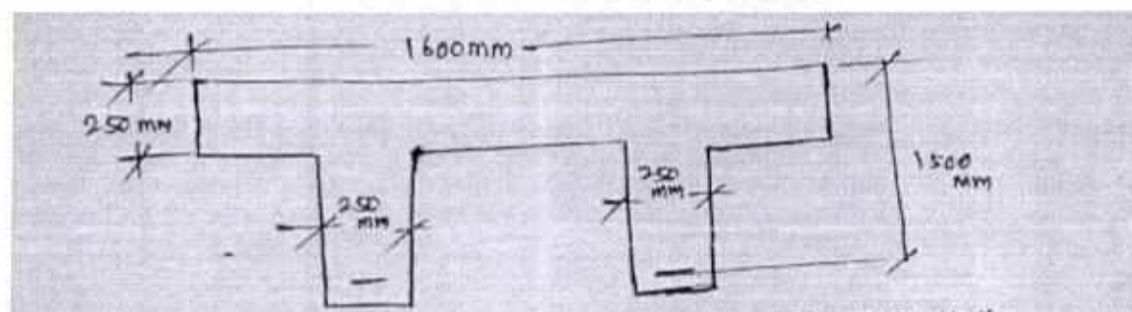
Span 10m, $f_{ct}=f_{cw}=16.5\text{MPa}$, $f_r=950\text{MPa}$, live load on slab 10kNm^2 , loss of stress in steel 18%. Design prestressing force and eccentricity corresponding to limit state of serviceability cracking. Also provide cables in safe cable zone. Determine the number of 3mm ϕ wires in each cable if slab is prestressed by 4 cables at a spacing 200mm c/c across the section. **[15]**

Q.P.Code:50867

B] A cantilever prestressed concrete beam of 8m span has rectangular section 300mmx600mm. It is prestressed by two cables of area 600mm² each, initially stressed to 1200N/mm². The cables are located at a constant eccentricity of 200mm above neutral axis throughout the span. Beam has to carry 30kN/m ultimate uniformly distributed load (inclusive of self weight). Verify its safety in limit state of strength shear when uncracked in flexure. Take $f_{ck}=40\text{MPa}$. [05]

Q6.A] A post tensioned prestressed concrete beam of 16m span is subjected to initial stress due to 1458kN prestressing force. Cable profile is parabolic with eccentricity of 520mm at mid span and zero at supports. Jacking is done from both ends. Estimate loss of stresses in steel for the following specifications.
C/s Area= $2.42 \times 10^5 \text{mm}^2$, $I=5.3 \times 10^{10} \text{mm}^4$, $A_{pst}=1386 \text{mm}^2$,
 $\epsilon_{ca}=45 \times 10^{-6}$, $\epsilon_{cd}=240 \times 10^{-6}$,
Creep co-efficient $\phi=1.4$, Anchorage slip=2.5mm at each end,
 $\mu=0.25$, wobble correction factor $K=0.0015/\text{m}$
 $f_s=1052\text{MPa}$ at transfer, $f_p=1600\text{MPa}$, $E_s=2.1 \times 10^5 \text{MPa}$, $E_c=0.382 \times 10^5 \text{MPa}$,
Calculate net loss of stresses and strain in steel accounting effect of stresses in steel due to bending caused by a load of 30kN/m (inclusive of self weight). [15]

B] A post tensioned prestressed concrete girder is a double T-section as under.



Total area of prestressing steel is 4700mm², $f_p=1600\text{MPa}$ and $f_{ck}=56\text{MPa}$. Verify its safety in limit state of strength flexure if ultimate moment acting at the section is 5000kN-m (inclusive of self weight). [05]
