School: SoET-REV. C-SCHEME **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	Design & Drawing of Reinforced Concrete Structures	CE-C701		✓	
2	Quantity Survey, Estimation and Valuation	CE-C702		✓	
3	Department Level Optional Course – III Prestressed Concrete	CEDLO701X		✓	
4	Department Level Optional Course – III ACT	CEDLO701X		✓	
5	Department Level Optional Course – IV Solid Hazardous Waste Management	CEDLO702X		✓	
6	Department Level Optional Course – IV Ground Improvement Techniques	CEDLO702X		✓	
7	Institute Level Optional Course – I	CEILO701X			

Note: SC – Softcopy, HC - Hardcopy

(Shaheen Ansari)
Librarian, AIKTC

10:30 am Sem - VII - CBG - Reg. CE R-19 8/12/22

Duration: 4 Hours **[Max Marks:80]**

Instructions:

(1) Question No 1 is **compulsory**.
(2) Attempt any **three** questions out of the **remaining five.**
(3) All questions carry equal marks.
(4) Use of **relevant IS codes** permitted
(5) Assume suitable data, if required and state it clearly.

1 Attempt any **FOUR**

a Explain the importance of ductile detailing in earthquake resistant design of structures **05 M**

b Differentiate between static and dynamic loads. Explain different types of dynamic loads **05 M**

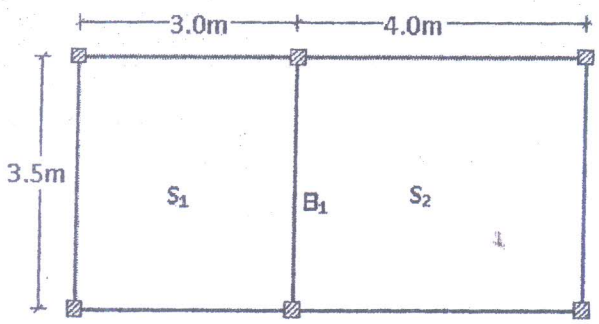
c Explain the structural behaviour of different components of a counterfort retaining wall **05 M**

d Distinguish between a rigid base and flexible base circular water tank based on their structural behaviour **05 M**

e What are the functions of longitudinal and transverse reinforcement in columns? **05 M**

2 a Design a circular water tank resting on ground for a capacity of 3 lakh litres. The water tank has a flexible base, walls and base slab are not monolithic with each other. Use M25 grade concrete and Fe 500 grade steel. Adopt WSM. Draw reinforcement details **12 M**

b Figure shows a slab beam system. The slabs S1 and S2 are having a thickness of 140mm, live load of 3 kN/m^2 and floor finish load of 1kN/m^2. The beam B1 is 250mm wide and 400mm deep. The beam is supporting a masonry wall of thickness 250mm and height 3m. Unit weight of masonry wall is 12 kN/m^3. Calculate the **total load** carried by beam B_1 including its self-weight. **08 M**



3 a A prestressed concrete beam 250mm wide and 400mm deep is prestressed with steel wires of area 350mm^2. The wires are provided at a uniform eccentricity of 50mm with an initial prestress of 1250N/mm^2. The beam has a span of 10m. Determine the final stress (after losses) and percentage loss of stress in the steel wires for the following cases **10 M**

(i) The beam is pre-tensioned

(ii) The beam is post-tensioned

Take E_s = 210kN/mm^2. E_c = 35kN/mm^2

Shrinkage of concrete = 300 x 10^{-6} for pretensioned beam

= 215 x 10^{-6} for post tensioned beam

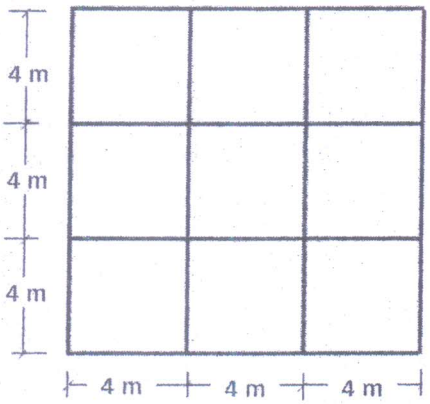
Relaxation of steel stress = 5% of initial stress

Creep coefficient = 1.6

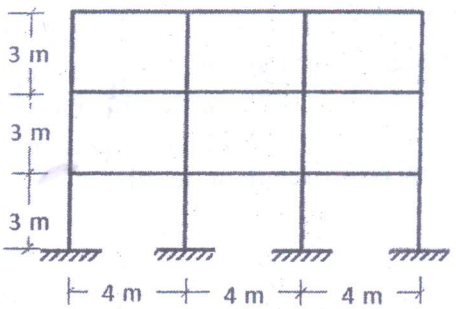
Anchorage slip = 1.25 mm

Friction coefficient for wave effect = 0.0015per m

b It is proposed to construct a 3-storied railway station building as shown in the figures given, in Pune as a special moment resisting frame. Intensity of dead load on each floor = 12 kN/m^2. Intensity of live load = 4kN/m^2. Type of soil: Hard. Determine the total design base shear on the structure using seismic coefficient method as per IS 1893(Part 1): 2016. Also show the distribution of base shear at different floor levels **10 M**



PLAN

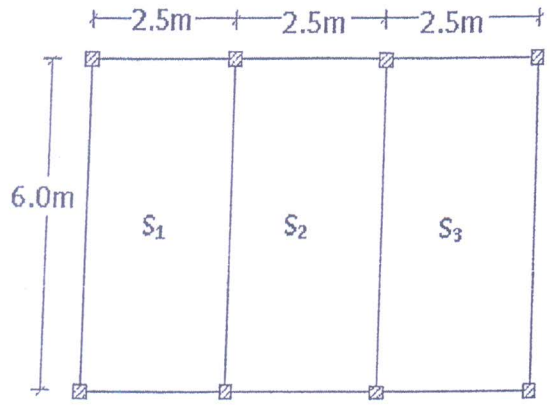


ELEVATION

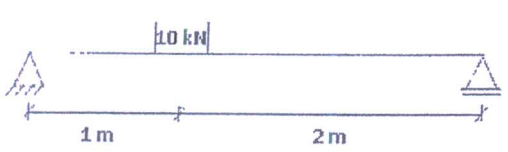
4 Design a suitable dog legged staircase for a room size of 3.5m x 5m and floor to floor height of 3.3m. Take live load as 3kN/m^2 and floor finish load as 1kN/m^2. Design both the flights and carry out the necessary serviceability checks. Draw functional plan showing dimensions of flights and midlanding **20 M**

Draw reinforcement details of both the flights. M20 grade concrete and Fe415 grade steel

5 a Figure shows the typical plan of an office building. live load on the slabs is 4kN/m^{2}and floor finish load 1kN/m^2. The slabs are supported on 230 mm thick beams on all sides. Design the continuous slabs S1-S2-S3 using IS Code coefficients. Adopt M20 concrete and Fe 500 steel. Carry out all serviceability checks. **14 M**



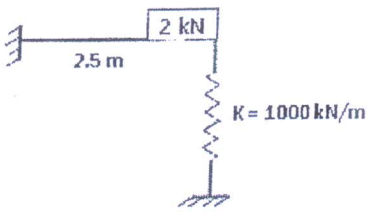
b Determine the natural frequency of following beams **06 M**



(a)

$E = 2.5 \times 10^4$ MPa

$I = 675 \times 10^6$ mm^4



(b)

$E = 3.2 \times 10^4$ MPa

$I = 520 \times 10^6$ mm^4

6 A reinforced concrete cantilever retaining wall is supporting a levelled backfill of height 4.2m above GL Depth of foundation is 1m below GL. Unit weight of backfill is 17kN/m^3 Angle of repose of soil is 28^0, SBC of soil is 180kN/m^2. Coefficient of friction between concrete and soil is 0.55. Design the stem and toe slab of the retaining wall. Carry out all stability checks. Draw reinforcement details of the retaining wall. Adopt M20 grade concrete and Fe 500 grade steel **20 M**

CE-R19

12/12/22

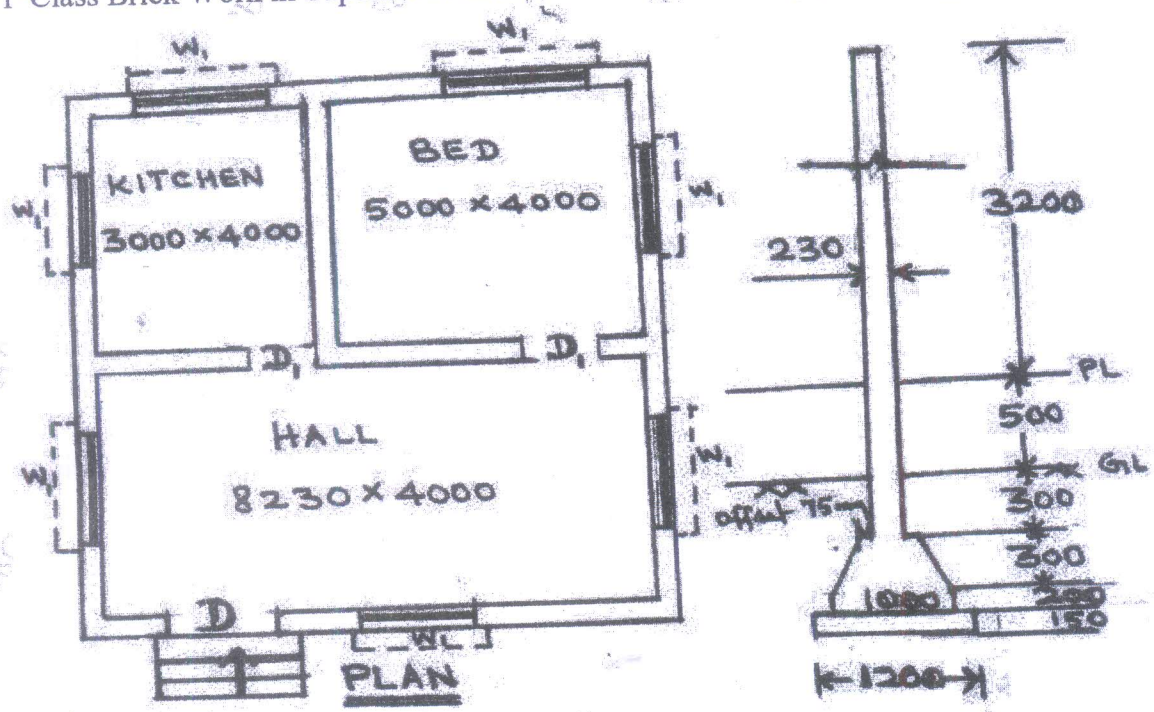
10.30am Sem-VII-C-19-Reg.

Time 4 Hours **Marks: 80**

N.B. : **(1) Question No.1 is compulsory**
(2) Attempt any **THREE** questions from the remaining 5 Questions
(3) Figures to the right indicate full marks
(4) Assume suitable data if necessary

Q1 Figure No 1 shows the plan and sectional details of a Framed Structure. **20**
Work out the quantities of the following items of work from **Figure No -1**

a) Total volume of Concrete in all footings
b) Flooring Quantity
c) Damp Proof Course
d) 1st Class Brick Work in Super Structure.



D =	1200 x 2100
D_1 =	1000 x 2100
W_1 =	1500 x 1200

(ALL DIMENSIONS ARE IN MM)

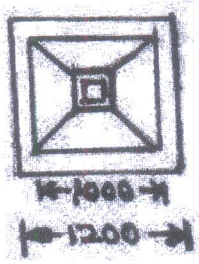


FIGURE No: 1

FOOTING DETAILS

Q2 (a) Prepare an Abstract of cost for all items in Question Number 1. 8

(b) Prepare the Bar bending schedule of a simply supported R.C.C. Lintel from the following specification: 12

Size of lintel 300 mm wide 200 mm depth.
Main bars in tension zone of Fe 250 (grade I) 3 bars of 16 mm dia., one bar is cranked through 450 at 170 mm from each end 2 No. anchor bars at top 8 mm dia.
Two legged stirrups@150mm c/c of 6mm dia. throughout.
Clear span of the lintel is 1150 mm. Bearing on either side is 150 mm.

Q3 (a) What are the points to be observed while framing the specification of the items? Draft the detailed specification for three coat internal plastering with synthetic enamel paint 8

(b) Estimate the quantity of earthwork for a portion of a road to be constructed by **Mid Sectional Area Method** from the following data. 12

Formation width = 10 m. Side slope in banking = 2:1, and in cutting 1:1.

Downward gradient 1 in 120 from chainage 0 to 120 while it remains in same formation level from 120 to 180 chainage and have again upward gradient 1 in 90 from 180 to 300 chainage.
Formation level at zero chainage is 210.5 m.
Chainage and corresponding ground levels are given below.

0	30	60	90	120	150
210.5	200.85	199.9	198.65	196.4	199.3
180	210	240	270	300	
198.1	196.33	197.26	196.55	197.28	

Q4 (a) Prepare an Approximate Estimate for Residential Building in western suburbs of Mumbai (RCC framed structure). 10

a) Plot Area- 60 m x 30 m
b) FSI- 1.5
c) Building is G + 6
d) Consider foundation cost as 20 % of superstructure cost.
e) Allow 20% of building cost for all services.
f) Allow 2.5% of overall cost for consultant fees.
g) Consider 5 % provision for contingencies.

b) i)Draft a tender notice for a construction of a library building by CIDCO, Navi Mumbai with an estimated cost of Rs. 12,54,67,475 and duration of project is 12 months. 5

ii) Write short notes on Mass Haul Diagram 5

Q5 (a) Prepare Rate Analysis for 12

a) RCC Work 1:1.5:3 for beam with 2% steel
b) 1st Class Brickwork in Superstructure with CM 1:6

(b) A person has purchased a plot of land costing of Rs.120000 and has constructed a building there on at a cost of Rs. 500000 including w/s. Sanitary and Electrical installations. Allowing a net return @ 7% cost of construction and 5 % net return on cost of land. Workout the standard rent of the property with the following data. 8

i) Sinking Fund on 4% basis for the future life of 70 years = 0.0022
ii) Annual maintenance @ 0.5% cost of construction
iii) Municipal taxes and other outgoings 28% of Gross rent.

Q6 Write short notes on any **FOUR** of the following: 20

a) IS 12OO
b) Price Escalation clause of Contract
c) Earnest Money Deposit
d) Easement Rights
e) Factors affecting Rate Analysis
f) Valid, Void and Voidable Contracts

10:30 am Sem-VII-C-19-Reg. CE (R-19) 14/12/22

Duration: 3 Hours **Total Marks: 80**

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

Q1

A Why high strength steel and high grade concrete is used in prestressed concrete structures? **04**

B Develop the equations for minimum sectional modulus required for section to be safe in limit state of serviceability maximum compression in flexure and cracking. **04**

C Differentiate between the losses of stresses in steel in pre-tensioned and post-tensioned elements. What are different factors influences the loss of stresses in steel due to shrinkage in concrete? **04**

D How different factors influence deflection of the beam? Calculate permissible limits of deflection of an 8 m long beam corresponding to different stages. **04**

E Steel with ultimate tensile strength 1600 MPa is used for prestressing. Determine the following. **04**
- **(i)** Maximum permissible initial stress in steel
- **(ii)** Maximum possible stress in steel at failure of section in limit state of collapse flexure
- **(iii)** Minimum stresses effectively available after all losses
- **(iv)** Loss of stress in steel due to relaxation, if initial stress in steel is 1200 MPa. Consider normal relaxation.

Q2

A A 5 m long simply supported beam 200 mm x 450 mm is prestressed by a parabolic cable carrying an effective force of 600 kN. Cable is located at 150 mm below centroid at mid span and concentric at supports. The beam supports a factored load of 90 kN/m (inclusive of self weight). Calculate the principal tensile stresses at support section at following mentioned fibers and compare with limiting value. Use M40 concrete. **10**
- **(i)** 100 mm above centroidal axis
- **(ii)** 100 mm below centroidal axis

B Define kern points and derive equation for top & bottom kern point. Also determine the efficiency of rectangular section of dimensions 'b x d' and circular section of diameter 'd'. **05**

C Explain the concept of load balancing. Sketch a load balancing cable for a concrete beam with a single overhang. Beam is simply supported at A & B over a span of 8 m and the overhang BC is 2 m. The beam supports uniformly distributed load over the entire span. **05**

Q3

A A posttensioned beam of rectangular section 200 mm x 450 mm is prestressed by a cable made up of 12 - 8 mm ϕ wires. Cable is linear with maximum eccentricity at mid span. It is located at 100 mm from soffit of the beam at mid span and concentric at supports. The wires are initially stressed to 1100 MPa. Jacking force is applied from one end only. **15**
Take $\mu = 0.15$, $K = 0.0066$ / m, anchorage slip = 2 mm, span = 6 m simply supported, $E_s = 210$ kN/mm^2, $E_c = 35$ kN/mm^2, shrinkage strain in concrete $(\varepsilon_{ca} + \varepsilon_{cd}) = 300 \times 10^{-6}$, creep coefficient = 1.6, consider 6 % relaxation loss.
Estimate loss of stress, loss of strain, percentage loss of stress and percentage loss of strain in steel.

B A prestressed concrete beam 150 mm wide and 400 mm deep of span 10 m is simply supp
It is subjected to a live load of 10 kN/m at service. Initially a prestressing force of 400 k
applied at a constant eccentricity of 50 mm. Take unit weight of concrete and characteris
strength of concrete as 24 kN/m^3 and 40 MPa respectively. Assume loss ratio as 0.85. Determin
shear strength of the section and comment on requirement of shear reinforcement.

Q4

A A concrete beam of 10 m simply supported span has 300 mm wide and 500 mm deep rectangular section. It is prestressed by 2 post-tensioned cables of area 600 mm^2 each. They are initially stressed to 1600 N/mm^2. The cables are located at 150 mm below neutral axis throughout the length. Take E_c = 38 kN/mm^2 and γ_c = 24 kN/m^3. **10**

(i) Neglect all losses, find the deflection at the center of the span at transfer stage.

(ii) Allowing 20 % loss in prestress, find the deflection at the center of the span when it carries an imposed load of 25 kN/m.

B A posttensioned concrete beam of simply supported span 16 m is of rectangular section 400 mm wide and 1200 mm deep. A tendon consists of 3300 mm^2 area is made of steel having characteristic strength 1700 N/mm^2. The tendon is located at 870 mm from the top face of the beam. If f_{ck} = 60 N/mm^2, estimate the ultimate flexural strength of the section and corresponding safe uniformly distributed load on the beam. Take γ_c = 25 kN/m^3. **10**

Q5

A post-tensioned unsymmetrical I-section having the following properties is used as a 30 m long simply supported bridge girder. **20**

Overall depth = 1000 mm, position of the centroid from top edge = 440 mm, area of C/s = 345000 mm^2, Z_t = 95 x 10^6 mm^3, Z_b = 75 x 10^6 mm^3

Consider type-1 element and M55 concrete with f_{ci} = 38.5 MPa, imposed load 3 kN/m, η = 0.75, γ_c = 25 kN/m^3

The girder is safe in limit state of serviceability maximum compression in flexure and cracking. Determine prestressing force and corresponding eccentricity. Ensure that CGS is at minimum 100 mm from soffit. Also locate safe cable zone.

Q6

A A 6 m long simply supported beam has rectangular C/s 200 mm x 450 mm. It is prestressed by a cable consisting of 20 H T wires of 4 mm ϕ each having f_i = 1000 MPa. Beam carries 8 kN/m impose load. Consider 20 percent loss in prestress at service. Cable is parabolic and placed with zero eccentricity at supports and maximum 125 mm towards soffit at mid span. Determine stresses at mid span, quarter span and support section at transfer and service stage. **15**

B Explain concept of thrust line? Sketch expected thrust line at transfer stage and service stage for a simply supported beam subjected to uniformly distributed load. Beam is prestressed by a parabolic cable, located below neutral axis at mid span and concentric at supports. **05**

****

10:30am CE (R-19) 14/12/22

Sem-VII - CBSGS - Reg.

(Time : 3 Hours) (80 marks)

N.B:

1. Question No:1 is compulsory
2. Attempt any three questions from the remaining five questions.
3. Figures to the right indicate full marks.

Q. 1. Attempt any four. (20)

a. Explain mud jacking and grouting for the foundation.

b. Illustrate the construction sequence of a diaphragm wall using a neat sketch.

c. Define dredging. State the purposes for which it is carried out

d. What is seismic retrofitting? How is it achieved?

e. Write a note on Smart Road Technology

f. Explain launching techniques for heavy decks.

Q. 2

a. Write an explanatory note on the construction sequence and methods of construction of domes (10)

b. Write an explanatory note on coastal construction techniques for making them soundproof as well as air and moisture-resistant. (10)

Q. 3 (10)

a. What are pre-engineered buildings? State their merits and demerits. Give some examples (10)

b. Explain the procedure for underwater drilling and blasting (10)

Q.4 (10)

a. Explain the construction sequence in the cooling tower of a thermal power plant (10)

b. Describe the stepwise procedure of strengthening a beam using RC Jacketing. (10)

Q. 5 (10)

	a.	Write an explanatory note on the trailing suction hopper dredger.	(10)
	b.	Describe the process of constructing concrete roads using pavers	(10)
			(10)
Q. 6	a.	Explain in detail various methods and techniques of ground improvement for soft soil.	(10)
	b.	Explain the stepwise procedure for the erection of large-span structures.	(10)

****

10:30am 16/12/22

Sem-VII C-19-Reg. CE (R-19)

Duration- 3 Hrs **Marks- 80**

N.B.:

1) Question **number one** is **compulsory.**
2) Attempt **any three** of **remaining five** questions.
3) Assume **suitable** data **if required.**
4) Draw **neat sketches** wherever **necessary.**

Q.1. Solve any four of the following: (20)

A. Volume reduction of solid waste.
B. Explain factors affecting the generation rate of solid waste.
C. State & explain characteristics of hazardous waste.
D. Write a short note on Life Cycle Assessment in SWM
E. What are the factors to be considered for selecting the landfill site.

Q.2. A) Estimate the volume of methane produce by anaerobic digestion of one tone of Waste having chemical composition $C_{55}H_{110}O_{35}N_2$ (10)

$$C_aH_bO_cN_d + \{(4a-b-2c+3d)/4\}H_20 \rightarrow \{(4a+b-2c-3d)/8\}CH_4 + \{(4a-b+2c+3d)/8\}CO_2 + dNH_3$$

B) Explain with a neat sketch working of municipal incinerator. (10)

Q.3 A) Explain Hauled container system and stationary container system with neat sketches. (10)

B) What is composting? Explain various types of composting with advantages & disadvantages of each. (10)

Q.4 A) Explain Physical , chemical and biological transformation of solid waste. (10)

B) Explain the EPA identification of toxic and hazardous waste. Explain methods of disposal of hazardous waste (10)

Q.5 A) Estimate the moisture content of MSW sample with following Composition (05)

Component	% by mass	Moisture content %
Food waste	20	70
Paper	40	6
Cardboard	10	5
Plastic	10	2
Garden trimings	10	60
Wood	5	20
Tin cans	5	3

B) Calculate the energy content of solid waste having the following composition using modified Dulong's formula. Figures in bracket are % by mass. (05)

1) Carbon (36.3) 2) Hydrogen (7.3) 3) Oxygen (51.1) 4) Ash (4.7)
5) Nitrogen (0.5) 6) Sulphur (0.1)

C) Define Biomedical Waste. Give sources of generation of Biomedical Waste. Enlist different methods of disposal of Biomedical waste and explain any one in detail. (10)

Q.6 Write short note on (any four) (20)

A) Pyrolysis
B) Transfer station
C) Legal aspects of solid waste disposal
D) 7' R' in SWM
E) Need of IOT in SWM

10:30 am CE (R-19) 15/12/22

Sem- VII - C-19- Reg

(Time: 3 Hours) Marks: 80

Note

1. Question No. ONE is compulsory
2. Attempt any THREE from remaining.
3. All questions carry equal marks.
4. Figures in right indicate the maximum marks for those questions.
5. Assume the suitable data if required and highlight the same.

Q 1.		Attempt any Four Questions	
	a.	Define soil nailing.	(5)
	b.	Write a short note on vertical drains.	(5)
	c.	How do you identify a soil is soft? Write a note.	(5)
	d.	What are the objectives of grouting?	(5)
	e.	Write a short note on geogrids.	(5)
Q 2.	a.	What are permanent ground improvement techniques? Explain in detail.	(10)
	b.	Discuss the applicability of industrial wastes in soil stabilization.	(10)
Q 3.	a.	Explain in detail with neat sketches the vibro-flotation technique of densification of deeper layers of granular soils and its quality control.	(10)
	b.	Discuss the benefits and limitations of blasting method of soil densification.	(10)
Q 4.	a.	What are the different admixtures that are used in expansive clay soil stabilization? Discuss plasticity, swelling and strength characteristics of fly ash treated black cotton soils.	(10)
	b.	Defining grouting, discuss various fields of applications of grouting in soil engineering.	(10)
Q 5.	a.	What are the stability checks in reinforced earth walls?	(10)
	b.	Calculate the capacity of horizontal strip anchor situated at a height of 8m below the ground level. The width of anchor is 2m. The soil is cohesionless having unit weight of 18 kN/m^3 and angle of internal friction 30 degrees. The coefficient of acceleration in horizontal direction is 0.1 and that of vertical direction is half of vertical acceleration.	(10)
Q 6.	a.	What are the factors considered for desired compaction on field?	(10)
	b.	Explain Pseudo-Static method by Mononobe-Okabe.	(10)