

Time: 3hour

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** Explain freyssinet method of prestressing in detail? **05**
- B** Define safe cable zone. Also develop the equations for limiting zone. **05**
- C** Differentiate the loss of stresses in steel in pre-tension and post-tension elements. **05**
- D** Explain various reasons for failure of a beam in flexure. **05**

Q2

- A** A 4 m long simply supported beam 200 mm x 450 mm is prestressed by a parabolic cable carrying an effective force of 200 kN. Cable is located at 150 mm below centroid at mid span and 100 mm above centroid at supports. The beam supports a uniformly distributed factored load of 80 kN/m (all inclusive). Calculate the principal tensile stresses at level of steel at support section and compare with permissible limit, if M40 concrete is used. **10**
- B** 8 m long concrete beam of C/s 200 mm x 300 mm supports 4 kN/m impose load. It is prestressed by a straight cable carrying an effective force of 450 kN at an eccentricity of 45 mm. Verify that it is an un-cracked section and evaluate load factor against cracking if modulus of rupture of concrete is 5 MPa. **05**
- C** Determine the efficiency of a T-section having following specifications. **05**
Flange: 500 mm x 200 mm, Web: 700 mm x 150 mm

Q3

- A** Estimate the ultimate moment capacity of a posttensioned T-section. The flange is 400 mm wide & 200 mm thick, the rib is 175 mm wide and 400 mm deep. The effective depth of cross section is 500 mm. Given; $A_{ps} = 1750 \text{ mm}^2$, $f_{ck} = 50 \text{ MPa}$, $f_p = 1600 \text{ MPa}$ **10**
- B** A 10 m long simply supported prestressed concrete beam 150 mm wide and 400 mm deep is subjected to a live load of 10 kN/m. A prestressing force of 180 kN is applied by a parabolic cable having an eccentricity of 100 mm at mid span and anchored at 100 mm above neutral axis at supports. Design shear reinforcement. Use $f_{ck} = 40 \text{ MPa}$. **10**

Q4

- A** A post tensioned beam of rectangular section having a span of 10 m is subjected to a uniformly distributed load of 15 kN/m. Consider width of the section 250 mm and loss ratio 0.85. If the section is designed as type-1 element & stresses in concrete should not exceed 15 N/mm^2 in flexural compression in any case, determine the following such that section is safe in limit state of serviceability maximum compression in flexure and cracking. **10**
- (i) Depth of the beam
 - (ii) Prestressing force
 - (iii) Eccentricity at mid span
- B** A pre-tensioned PSC beam having a rectangular section of 150 mm width and 300 mm effective depth has an effective cover of 50 mm. Calculate the ultimate shear strength and ultimate flexural strength of the section, if $f_{ck} = 50 \text{ MPa}$, $f_p = 1600 \text{ MPa}$, $f_i = 1150 \text{ MPa}$ and $A_{ps} = 450 \text{ mm}^2$. **10**

Q5

A A 30 m long post-tensioned bridge girder is designed to carry imposed load of 3 kN/m is an **10**
 unsymmetrical I-section having the following properties;
 $D = 1000 \text{ mm}$, $\bar{y}_t = 440 \text{ mm}$, $A = 345000 \text{ mm}^2$, $Z_t = 95 \times 10^6 \text{ mm}^3$, $Z_b = 75 \times 10^6 \text{ mm}^3$
 Consider type-I element and M55 concrete with $f_{ci} = 38.5 \text{ MPa}$, imposed uniformly distributed
 load 3 kN/m.
 Determine optimum prestressing force and corresponding eccentricity such that beam is safe in
 limit state of serviceability cracking and maximum compression. Take $\eta = 0.85$

B A concrete beam with a single overhang is simply supported at A & B over a span of 8 m and the **10**
 overhang BC is 2 m. The 300 mm wide & 900 mm deep beam supports a uniformly distributed
 live load 33.52 kN/m over the entire span in addition to its self-weight. Suggest suitable cable
 profile which can balance the dead and live load. Determine the eccentricity of the prestressing
 cable at different prominent sections if effective force in it is 750 kN. Take $\gamma_c = 24 \text{ kN/m}^3$

Q6

A A pretension beam 250 mm wide and 300 mm deep is prestressed by 12 wires, each of 7 mm ϕ , **10**
 initially stressed to 1200 N/mm^2 with their centroid located at 100 mm from soffit of the beam.
 Calculate;

- (i) Loss in stress and % loss of stress in steel
- (ii) Loss in strain and % loss of strain
- (iii) Loss in prestressing force and % loss in prestressing force

Use following data;

Relaxation of steel: 90 MPa, $E_s = 210 \text{ kN/mm}^2$, $E_c = 38 \text{ kN/mm}^2$, creep coefficient: 1.6, residual
 shrinkage strain = 3×10^{-4}

B A beam with C/s 100 mm x 300 mm, span 4 m is prestressed by three cables each carrying a force **10**
 of 160 kN. Take $E_c = 35 \times 10^3 \text{ MPa}$

Cable	Profile	Position at support	Position at mid span
1	Parabolic	50 mm above n.a	50 mm below n.a
2	Parabolic	At neutral axis	50 mm below n.a
3	Straight	50 mm below n.a	50 mm below n.a

Estimate the deflection at transfer stage and compare with respective permissible limit.

(3 HOURS)

[Total Marks:80]

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 **(20)**

- a Explain the concept of soil heating.
- b Describe Micro piling and underpinning for strengthening the floor.
- c Describe Solar paints.
- d Write down the stepwise procedure of dredging.

Q 2 **(20)**

- a Describe the procedure for erecting lightweight components on tall structures. 10
- b Explain the balanced cantilever method of Bridge construction. 10

Q 3 **(20)**

- a Describe the construction of the underwater diaphragm wall. 10
- b Mention the key aspects of green building and comment on LEED and GRIHA ratings. 10

Q 4 **(20)**

- a Explain the methodology adopted in the post-tensioning of the slab. 10
- b What are Pre-Fabricated Vertical Drains? How are they installed? 10

Q 5

- a Explain how seismic Retrofitting for Slabs is done. 10
- b Explain micropiling & underpinning. 10

Q 6 Write short notes on: **(20)**

- a 3-D printing in construction.
- b Dewatering for underground open excavation.
- c Air and moisture barrier.
- d Articulated Structures.

(3 Hours)

[Total Marks : 80]

Notes :

1. Question 1 is compulsory
2. Attempt any 4 out of six questions
3. Assume any suitable data wherever required

Q1. Attempt (Any 4)

- a) What are the Heuristic guidelines for laying collection route? 05
- b) Explain various characteristics of hazardous waste. 05
- c) Explain how you will manage the construction and demolition waste. 05
- d) Describe 7R principle in solid waste management. 05
- e) Calculate energy content of solid waste sample with following composition 05
C- 38%, H-9.5%, O-41.5%, N-6%, S-2%

- Q2. a)** Estimate the theoretical volume of methane produced from 1 tonne of waste having chemical composition $C_{65}H_{120}O_{40}N_2$ 10
- $$CaHbOcNd + \left(\frac{4a-b-2c+3d}{4}\right) H_2O \longrightarrow \left(\frac{4a+b-2c-3d}{8}\right) CH_4 + \left(\frac{4a-b+2c+3d}{8}\right) CO_2 + dNH_3$$
- b)** What are the methods of collection of solid waste? Explain the stationary container system. 10

- Q3. a)** What are the factors to be consider in selection of landfill site? Explain leachate control method in the landfill. 10
- b)** Explain in detail the factors affecting composting process. 10

- Q4. a)** Explain how hazardous waste handling, collection, storage and minimization is carried out. 10
- b)** Explain the treatment and disposal methods for biomedical waste management. 10

- Q5. a)** What are the factors affecting the generation rate of solid waste? Explain methods of volume reduction at the source. 10
- b)** What do you understand by pyrolysis process? What are its end products? Also explain the limitations of this process. 10

- Q6. Write a short note on** 20
- a) Transfer station
 - b) Recovery of E- waste
 - c) Plastic waste management rules and regulation
 - d) Legal aspect of solid waste management
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Time: 3-hour

Max. Marks: 80

Please Note:

1. All questions carry equal marks
2. Question one is compulsory. Attempt any three out of remaining questions.
3. Assume suitable data if required and state if clearly.

- Q1 Attempt any four 20
- a) Analyse the legal role of Architects in construction.
 - b) Elaborate Purpose and Sanctity of Contract.
 - c) Discuss 'E-Tendering process'.
 - d) Summarize the process for Publication of an Arbitration award.
 - e) Do you think it is important for civil engineers to know the legal aspects of construction. Explain with two examples.
- Q2 a) Discuss the important provisions of Building and Other Construction Workers Act, 1996. 10
- b) You are appointed as Safety engineer. Discuss your role to ensure safety at the construction site. 10
- Q3 a) Discuss the Unit Price Contract. Compare the advantages and disadvantages of Unit Price Contract. 10
- b) Discuss the important provisions of GST Tax Act 2017. 10
- Q4 a) List the types of Tendering. Explain any three documents which need to be submitted with tender. 10
- b) Explain Indian's Climate target as per Paris agreement. 10
- Q5 a) Discuss the Standard methods of resolving disputes. Explain any one with case study. 10
- b) Discuss following terms about Tender 10
- 1) Scrutinization process
 - 2) Award
 - 3) Acceptance
- Under what conditions tender may be rejected.
- Q6 a) Analyse the any three clauses of the Environment (Protection) Act, 1986. 10
- b) Discuss the term 'Breach of Contract'. Comment on Professional ethics to be followed by Contracting Parties. 10

Time: 3 hours

Marks: 80

N.B.: 1) Question No.1 is compulsory.

2) Attempt any THREE questions out of remaining FIVE questions.

3) Figures to the right indicates full marks.

4) Assume suitable data if necessary.

- Q1 Attempt Any 4** **20**
- a Explain about digital evidence.
 - b Explain different password cracking techniques.
 - c What are different Security Risks for Organizations?
 - d What is Cybercrime? Who are Cybercriminal? Explain.
 - e Explain about Credit card frauds in Mobile and Wireless Computing era.
- Q.2**
- a If a hacker creates a website similar to university website to cheat student. Identify attack and explain different types it. How to prevent from such attack. **10**
 - b Discuss steps involved in planning of cyberattacks by criminal. **10**
- Q.3**
- a Explain different types of Cybercrimes and how security will provide? **10**
 - b Explain why do we need cyber laws? Discuss about the challenges to Indian cyber laws **10**
- Q.4**
- a Explain Steps for SQL Injection attack. How to prevent SQL Injection attacks? **10**
If an attacker creates heavy traffic on the college website so that it becomes **10**
 - b inaccessible to the legitimate user. Which is this attack. Explain in details with it's types.
- Q.5**
- a What are illegal activities observed in Cyber Cafes? What are safety and security measures while using the computer in Cyber Café? **10**
 - b What are basic security precautions to be taken to safeguard Laptops and Wireless devices? Explain? **10**
- Q.6 Write short notes on any FOUR** **20**
- a Salami attack
 - b HIPAA
 - c Mobile/Cell Phone attacks
 - d Cyberstalking and harassment
 - e SOX
 - f Buffer overflow attack

(3 Hours)

[Total Marks :80]

Notes:

1. Question No 1 is compulsory.
2. Answer any 3 from remaining questions.
3. Illustrate your answers with neat sketches wherever necessary.
4. Write proper Question and sub question numbers as assigned in this question paper.

Q.1 Answer any four questions: (20)

- a) Justify the significance of studying Disaster Management, highlighting its role in enhancing resilience, minimizing risks, and promoting sustainable development. 5
- b) Define and differentiate between Risk and Vulnerability in the context of disaster management. 5
- c) Provide an overview of various types of Manmade disasters, elucidating their causes, characteristics, and impacts. 5
- d) Analyze the enduring impacts of disasters on affected communities, infrastructure, and socio-economic systems. 5
- e) Discuss Climate change, focusing on its underlying causes, ecological repercussions, and implications for disaster risk management. 5
- f) Define Bioshield and explore its utility in disaster mitigation, particularly in addressing specific hazards such as floods, landslides, and coastal erosion. 5

Q.2 a) Explore the scope and responsibilities of the NIDM in disaster preparedness, training, research, and policy formulation 10
b) Describe the Search and Rescue (SAR) procedure in disaster response, supported by a case study illustrating its implementation and effectiveness. 10

Q.3 a) Investigate the applications of GIS in disaster management, highlighting its role in spatial analysis, risk assessment, and decision-making. 10
b) Assess the contributions of various NGOs in Disaster Management, outlining their roles in emergency response, community engagement, and capacity-building initiatives. Additionally, list major NGOs operating globally in this field. 10

Q.4 a) Examine the multifaceted components of Disaster Management, including preparedness, response, recovery, and mitigation strategies. 10
b) Classify different types of droughts and outline structural mitigation measures suitable for drought-prone regions. 10

- Q.5** a) Evaluate various fundraising mechanisms for disaster management, considering their effectiveness, sustainability, and ethical implications. **10**
- b) Define Capacity Development and illustrate its application through a case study of Community-Based Disaster Management (CBDM), emphasizing community empowerment, resilience-building, and sustainable development. **10**
- Q.6** a) Enumerate essential Do's and Don'ts for disaster preparedness and response, providing practical guidelines for individuals and communities to mitigate risks and ensure safety. **10**
- b) Discuss the roles and functions of various government agencies in Disaster Management in India, emphasizing their coordination and collaboration efforts. **10**
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Time 4 Hours

Marks: 80

Note:

- i) **Q.1 is compulsory**
- ii) Attempt **any three** out of remaining **Five** Questions.
- iii) Figures to right indicates full marks.
- iv) Assume Suitable data if required.

- Q.1** Workout following quantities from given plan and section. (**Fig.01**). **20**
- a) Excavation for all footings.
 - b) Brickwork in superstructure with cement mortar 1:5.
 - c) Internal plastering of 12 mm thickness with cement mortar 1:4.
 - d) Flooring and skirting
- Q.2** A) Explain the meaning of specification. Draft general specifications for first class brickwork in cement mortar. **10**
- B) Explain in brief rate analysis? Prepare rate analysis for Vitrified tile flooring work laid on 25 mm thick base course in c:m 1:6. **10**
- Q.3** A) Prepare approximate estimate for estimate of (G+3) RCC framed building with 4 flats per floor each of 100m² carpet area. The building is situated in Mumbai suburb region. Consider the followings:
- i) Allow 18 % building cost for services such as lift, electrical and plumbing.
 - ii) Allow 4 % overall cost for consultant's fee.
 - iv) Consider 5% contingencies. **10**
- B) Explain pre-qualification of contractor. **04**
- C) Draft Notice inviting tender for construction of Primary School Building in Thane region estimated cost of Rs. 200 lacs time limit for work is two years. Contract will be having item rate type and tender fee Rs. 2000/- along with document **06**
- Q.4** A) A concrete mixer was purchased at Rs. 90,000/- Assuming salvage value of Rs.10,000/-after 5 years. Calculate depreciation for each year adopting a) Straight line method, b) Constant percentage method, c) Sinking fund method. **10**
- B) What are different types of contracts. Explain any two in detail. **10**

Q.5 A) Calculate volume of earthwork in cutting and in banking for the road section whose details are given below. Use mean area method:

Chainage	0	30	60	90	120	150	180	210
RL of ground(m)	161.50	160.95	160.55	161.55	161.85	162.95	162.35	162.80

Width of formation 10m. F.L. at zero chainage = 161.60m, rising gradient is 1:110. side slopes = 1.5:1 in banking and 2:1 in cutting. **10**

B) A rectangular beam 20 cm x 30 cm, 3m overall length with tor steel bar 3 Nos. And 16mm ϕ . Wt. Of bar is 1.58 kg/m. Two outer bars are straight and L shaped hooks are provided at end. One inner bar bent at 45° and L shaped hooks are provided at end. At the top two outer bars are provided having 16mm ϕ and wt. 0.62 kg/m. These bars are straight and L shaped hooks are provided at end. Stirrups are provided at distance of 20 cm c/c with 6mm ϕ and wt. 0.22 kg/m. Consider 25mm cover. **10**

Q.6 Write short notes on (any Five). **20**

- a) Easement rights.
- b) Mass Haul Diagram
- c) EMD and SD
- d) Rules for deduction in plastering work & Brickwork.
- e) Technical Sanction
- f) Balanced and unbalanced tender.

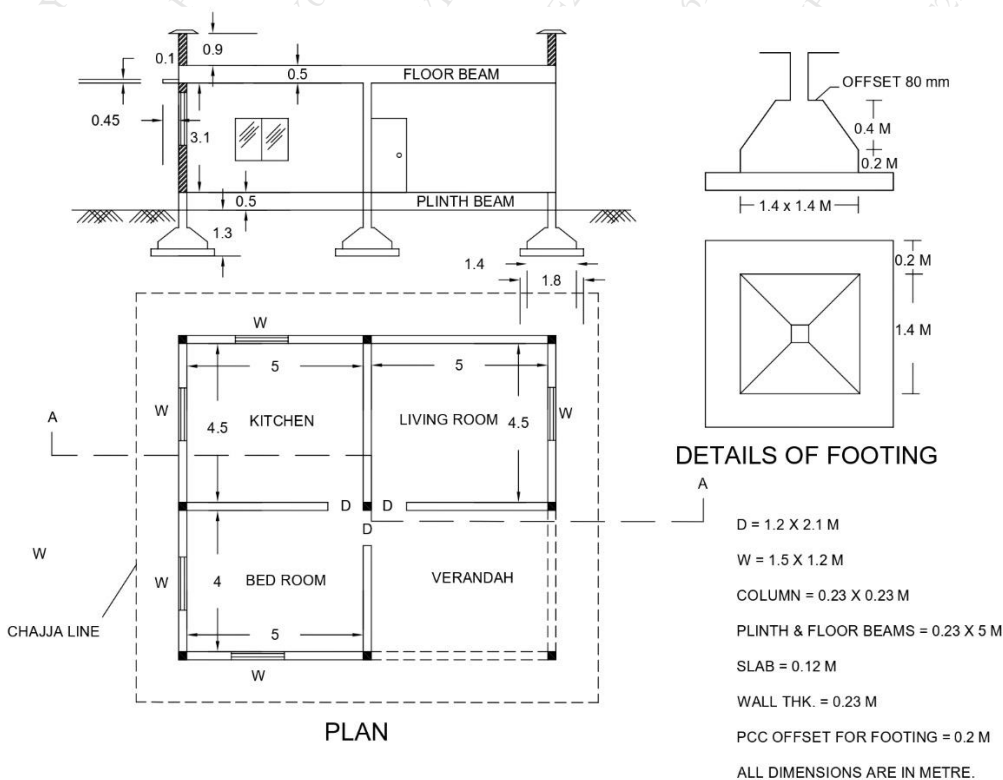


Fig.01

[Duration: 4hrs]

[Max Marks: 80]

Instructions:

- (1) Question No 1 is **compulsory**.
- (2) Attempt any **three full** questions out of the **remaining five**.
- (3) Each **full** question carries **20** marks.
- (4) Use of all **relevant IS codes** permitted
- (5) Assume suitable data, if required and state it clearly.

1. Answer any FOUR

- a** Represent the dynamic equilibrium of single degree of freedom system using a typical sketch. Also write the corresponding equation. **05 M**
- b** Discuss about the importance of ductile detailing in earthquake resistant structures. **05 M**
- c** Explain counterfort retaining wall with sketches showing behaviors of stem, heel & toe. **05 M**
- d** Enlist various joints in water tank. Explain any two types with neat sketches. **05 M**
- e** Discuss about open-well staircase with a neat sketch. **05 M**
- f** Why high strength concrete & high strength steel are used in prestressed concrete? Discuss with detailed technical reasons. **05 M**

- 2.** Design heel, toe & stem of a cantilever retaining wall. It retains a horizontal backfill of height 5.6 m. above the ground level. Adopt Limit State Method. The backfill soil has a density of 18 kN/m^3 and an angle of internal friction of 28 degrees. The safe bearing capacity of foundation soil is 250 kN/m^2 . The coefficient of friction between soil and base slab concrete is 0.65. Use M20 concrete and Fe415 steel. Carry out the stability checks. Draw detailed reinforcement sketches. **20 M**

- 3.** Design a circular water tank open at the top. It is having a flexible base. It rests on the ground. Adopt Working Stress Method. The capacity of tank is 6,25000 litres. M30 concrete and Fe415 steel are to be used. Permissible stress in concrete in direct tension is 1.5 MPa and permissible stress in steel is 130 MPa. Draw detailed reinforcement sketches. **20 M**

OR

- Design an open rectangular water tank which rests on ground. The dimensions to be provided are (7.2 m length x 3 m width x 3.2 m height). Use M25 concrete & Fe415 steel. Use working stress method. Draw a sketch showing steel details. **20 M**

- 4. a** Design a dog-legged staircase for a room with clear dimensions (2.7 m X 4.6 m). Floor to floor height is 3.2 m. Stairs are not liable to overcrowding. Stairs are supported on 230 mm thick walls at the ends of the landings (i.e. landings span parallel to the flights). Use M20 concrete and Fe415 steel. Carry out checks for shear & deflection. Show steel details. Use limit state method. **15 M**
- b** Distinguish between one-way slab & two-way slab. **05 M**

5. a A rectangular concrete beam has a C/S of 150 mm width and 360 mm depth. It is pre-tensioned by straight wires located 65 mm below the neutral axis. The wires carry an initial force of 195 kN. Young's modulus of steel is 210 kN/mm^2 and that of concrete is 36.5 kN/mm^2 . The total area of steel wires is 240 mm^2 . Determine the percentage loss of stress in steel due to elastic deformation of concrete. **05M**
- b Determine natural time period & natural frequency for the system shown in fig. 1 **05M**

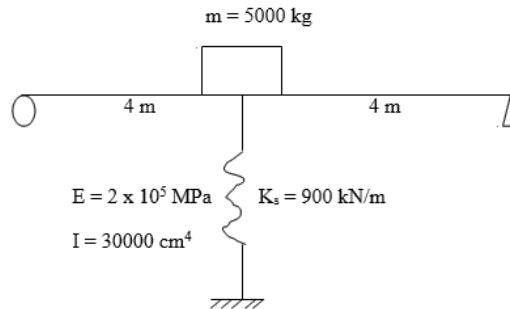


Fig. 1

- c Write a note on design load calculation by seismic coefficient method. **05M**
- d Figure 2 shows a RCC slab-beam system. Slab S_1 is 160 mm thick and slab S_2 is 135 mm thick. Live load on both the slabs is 4.5 kN/m^2 and floor finish load on both the slabs is 1.1 kN/m^2 . Beam B_1 is 280 mm wide and 550 mm deep. It carries a masonry wall of width 230 mm and height 3 m on its entire length. Unit weight of masonry is 20 kN/m^3 . Calculate the load carried by beam B_1 , including its self weight. Use limit state approach. **05M**

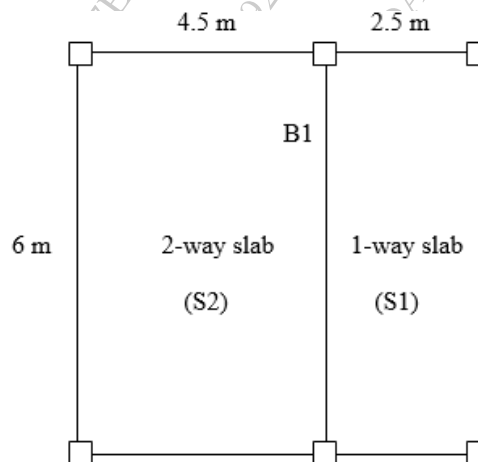


Figure 2

6. Design a slab for a room having clear dimensions (4.5 m X 5.2 m). Adopt Limit State Method. The slab is continuous on all the four edges. Live load on the slab is 3.5 kN/m^2 and floor finish load is 1.2 kN/m^2 . Use M20 concrete and Fe415 steel. Carry out the checks for shear, deflection & cracking. Draw neat sketches showing steel details. **20 M**