

(Time: 4 Hours)

(Total Marks: 80)

- N.B:** 1. Question number 1 is compulsory; attempt any three out of the remaining five questions.
 2. Use of relevant IS codes is permitted.
 3. Assume suitable data wherever necessary.

1. Attempt ANY **FOUR**

20

- Explain importance of ductile detailing in RCC design.
- Differentiate between a rigid base and flexible base in water tanks based on their structural behaviour.
- Write down step by step procedure for design of isolated footing.
- Explain any three general guidelines for planning the staircase.
- Differentiate between static and dynamic loads. Explain different types of dynamic loads.

2. Design a cantilever retaining wall to retain 5.2 m earth above ground level. Take SBC 200 kN/m^2 and density of soil 18 kN/m^3 respectively. Use M20 and Fe415 steel, $\mu = 0.6$, $\phi = 30^\circ$. Depth of foundation is 1 m below ground level. Draw reinforcement details.

20

3. Design a dog-legged stair for a building in which the vertical distance between floors is 3.6m. The stair hall measures 3.5m x 5m. The L.L may be taken as 2.0 kN/m^2 . Use M20 concrete and Fe415 steel bars. Draw reinforcement details.

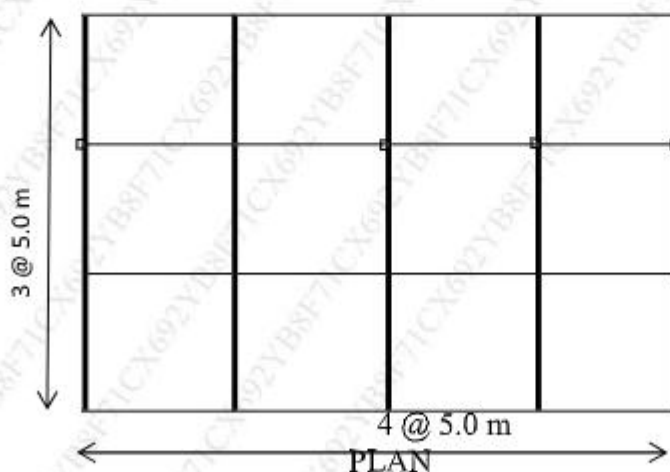
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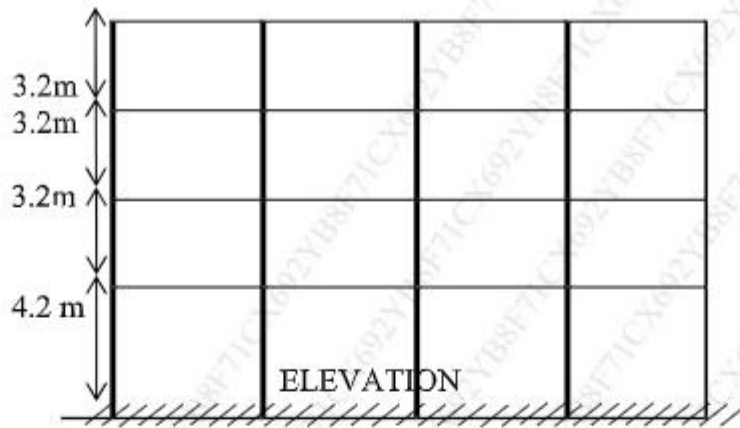
4. Design a circular water tank resting on ground by approximate method for a capacity of 3 lac liters. The water tank has flexible base. Use M25 grade of concrete and Fe500 steel. Draw reinforcement detail.

20

5. (a) The building shown in figure is located in Mumbai. The soil conditions are hard and the entire building is supported on a raft foundation. The R. C. frames are infilled with brick-masonry. The lumped weight due to dead loads is 10 kN/m^2 on floors. The floors are to cater for a live load of 3 kN/m^2 on floors. Determine design seismic load on the structure as per IS:1893(Part1)2016.

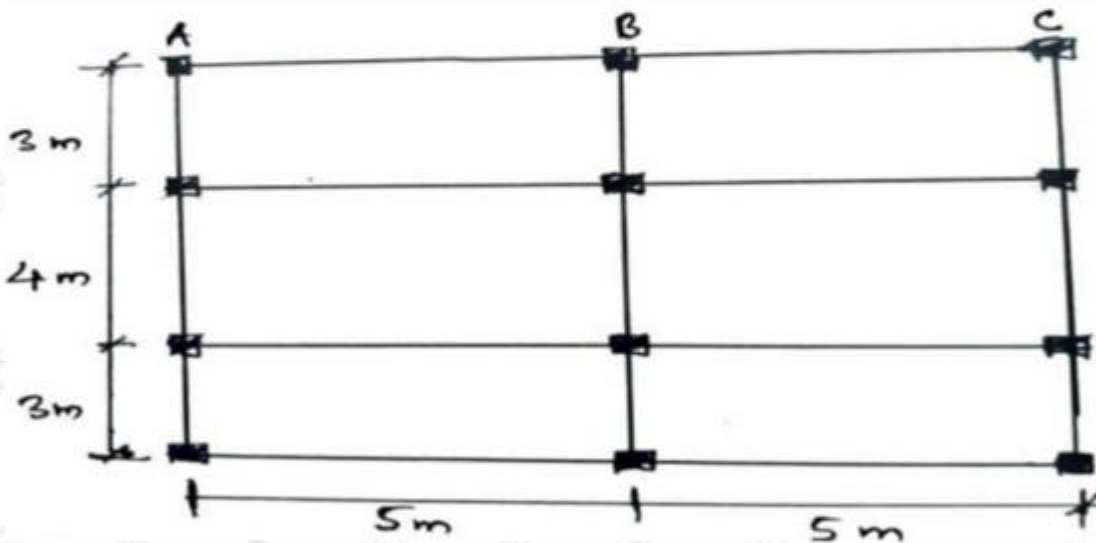
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b) In a post-tensioned beam cable is subjected to a stress of 1000 N/mm^2 . If the slip is found to be 3 mm . find the percentage loss due to this cause. The beam is 15 m long.
Take $E_s = 200 \text{ kN/mm}^2$ **06**

6. The framing plan of a building is shown below. The design live load is 3 kN/m^2 and floor finish is 1 kN/m^2 . All external walls are 230 mm thick and internal walls are 150 mm thick. Slab thickness is 200 mm and floor to floor height is 3.2 m . All columns are of $450 \text{ mm} \times 450 \text{ mm}$. Grade of concrete is M20 and steel is Fe415 .
Design beam ABC and draw reinforcement details. (Design of slab is not required) **20**



Duration: 3 hours

Max. 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** **20**
- a What is Cybercrime? Who are Cybercriminals? Explain.
 - b How Cybercrimes differs from most terrestrial crimes?
 - c What are different Security Risks for Organizations?
 - d Outline the challenges for securing data in business perspective.
- Q.2**
- a What are illegal activities observed in Cyber Cafe? What are safety and security measures while using the computer in Cyber Cafe? **10**
 - b What is digital evidence? Where one can find it. **10**
- Q.3**
- a Explain different types of Cybercrimes. **10**
 - b What are basic security precautions to be taken to safeguard Laptops and Wireless devices? Explain. **10**
- Q.4**
- a Explain Steps for SQL Injection attack. How to prevent SQL Injection attacks? **10**
 - b Discuss steps involved in planning of cyberattacks by criminal. **10**
- Q.5**
- a What is vishing attack? How it works? How to protect from vishing attack? **10**
 - b What is e-commerce? Discuss types of e-commerce. **10**
- Q.6 Write short notes on any FOUR** **20**
- a Cyberstalking and harassment
 - b HIPAA
 - c Buffer overflow attack
 - d Botnets
 - e DOS attack
 - f Mobile/Cell Phone attacks
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Time : 3 Hours

Marks : 80

1. Question no. 1 **compulsory**.
2. Answer any three questions out of remaining five
3. Attempt sub questions in order
4. Figures to the right indicate full marks.

1. Explore the following topics (**any 4**): [20]
 - a) Evolving approaches to disaster management in India.
 - b) Urban flooding: Implications for major cities.
 - c) Leveraging technology for disaster preparedness.
 - d) Global aid organizations in crisis response.
 - e) Guidelines for earthquake safety.
 - f) Human repercussions of natural calamities.

2. a) Outline the functions and duties of NIDM [06]
2. b) Evaluate the impact of disasters on infrastructure and their hindrance to developmental projects. [06]
2. c) Define early warning systems and illustrate their benefits through recent instances of flood, cyclone, and tsunami alerts. [08]

3. a) Examine NDMA's directives for disaster preparedness in India. [06]
3. b) Examine the collaborative efforts of government bodies and NGOs in disaster management. [06]
3. c) Explain Triage. Analyze the importance of initial response in disaster management. [08]

4. a) Investigate the contributions of international aid agencies during extreme crises. [07]
4. b) Explore the applications of GPS and GIS in drought mitigation strategies. [07]
4. c) Describe non-structural measures for pandemic containment, [06]

5. a) Assess the involvement of different stakeholders in mass casualty situations. [06]
5. b) Delve into the paradox of industrialization: economic progress versus the threat of industrial mishaps. [08]
5. c) Highlight the protective role of natural ecosystems against disasters, with examples [06]

6. a) Define liquefaction and debate the merits of retrofitting versus relocation in landslide-prone areas. [06]
6. b) Define vulnerability and its significance in disaster management. [04]
6. c) Enumerate preparedness measures for minimizing chemical disaster losses. [05]
6. d) Propose strategies for funding disaster relief efforts and discuss legal considerations [05]

Time: 3-hour

Max. Marks: 80

Note:

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

- Q1** **Attempt any four** **20**
- a) State the Objectives of GIS
 - b) State the types and functions of DBMS
 - c) What do you mean by Geo referencing .
 - d) Explain how network analysis can help in solving various problems.
 - e) State the various advantages of Geographic Information System.
 - f) What is TIN ((Triangulated reregulated network) data model
- Q2** a) What is GIS and state its various components **10**
 b) Differentiate between Vector and Raster Data **10**
- Q3** a) Explain Projection Coordinate System: Polar – Transformation **10**
 b) Short Note on Toposheet and various open source data **10**
- Q4** a) **Short note on (any 2)** **10**
 i. Advantages of GIS
 ii. Maps and its scale
 iii. Satellite image and image classification
 iv. Map digitization and editing
- b) **Explain : (any 2)** **10**
 i. Raster File and Vector file Formats and
 ii. Web GIS
 iii. Map Layouts , Charts , Graphs and Multimedia output
- Q5** a) **Short note on (any 4)** **10**
 i. Buffer analysis
 ii. Spatial Analysis (DEM Analysis)
 iii. Surface Analysis
 iv. Proximity Analysis
 v. Data Selection
 vi. Re-classification
 vii. Overlaying analysis
- Q6** a) Write short note on Open Source Software. **10**
 b) **Short note (any 2)** **10**
 i. Spatial and Non-Spatial data presentation
 ii. Elements of spatial data quality
 iii. Raster to Vector conversation
 iv. Vector to Raster Conversation

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Duration: 3 Hours

[Max Marks: 80]

NB:

- (1) Question No.1 is Compulsory
- (2) Attempt any three questions out of remaining five.
- (3) All questions carry equal marks
- (4) Assume suitable data, if required and state it clearly.

1. Attempt any **FOUR** **[20]**
 - a. What are technical measures of Information Security
 - b. Explain concept of Identification, Authentication.
 - c. Illustrate various XSS attacks.
 - d. Explain benefits of Cloud computing
 - e. List down various Malwares and describe anyone.
 2. a. Illustrate an Overview of Certifiable Standards in (How, What, When, Who).term. **[10]**
b. Compare Intrusion Detection System (IDS) and Intrusion Prevention System (IPS). **[10]**
 3. a. Explain how availability is calculated including metrics such as Mean Time Between Failure (MTBF) and Mean Time to Repair (MTTR). **[10]**
b. Describe OCTAVE: Risk Assessment Framework along with its benefits. **[10]**
 4. a. Describe various Disaster Recovery Techniques. **[10]**
b. How are access control methods categorized into administrative, physical, technical and the layering of access control? **[10]**
 5. a. Compare the quantitative and qualitative risk assessment approaches. **[10]**
b. Explain Open Web Application Security Project (OWASP) and identify the common issues in Web Apps. **[10]**
 6. a. What are the key characteristics of NIST risk assessment framework? **[10]**
b. What are the objectives of IT ACT? Explain in detail IT ACT 2000 and IT ACT 2008. **[10]**
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(3 Hours)

[Total Marks : 80]

1. Question no **one** is **compulsory**.
2. Answer any **three** from remaining.
3. **Assume** any additional data if necessary and state it clearly.

- Q1** Attempt (Any 4)
- a What are the Heuristic guidelines for laying collection route? 05
 - b Define RDF and manufacturing process of RDF 05
 - c State and explain characteristics of hazardous waste management 05
 - d Write a note on bioreactor landfill 05
 - e Describe 7R principle in solid waste management. 05
- Q2**
- a How do seasonal variations affect the quantity and composition of solid waste? Provide examples of specific waste types that are influenced by seasonal changes. 05
 - b. What are the key factors that influence the rate of composting? 05
 - c. How can educational institutions contribute to solid waste management awareness? Suggest specific activities or programs that can be implemented in schools and colleges. 10
- Q3**
- a Compare the stationary container system with the hauled container system. Draw the both diagrams. 10
 - b Discuss the importance of volume reduction at the source in solid waste management. What techniques can be employed to achieve this? 10
- Q4**
- a Describe the pyrolysis process in waste management, including the temperature range and types of materials that can be processed. What are the main products obtained from pyrolysis? Discuss one advantage of using pyrolysis. 10
 - b Estimate the volume of methane produce by anaerobic digestion of one tone of waste having chemical composition $C_{50}H_{100}O_{30}N_2$ 10
- $$C_aH_bO_cN_d + \left(\frac{4a-b-2c+3d}{4}\right) H_2O \rightarrow \left(\frac{4a+b-2c-3d}{8}\right) CH_4 + \left(\frac{4a-b+2c+3d}{8}\right) CO_2 + dNH_3$$
- Q5**
- a Explain colour coding of Biomedical waste. 05
 - b. How would you apply environmentally sustainable practices to improve biomedical waste disposal, processes in hospital while ensuring compliance with local regulations? 05
 - c If you are tasked with managing a landfill that is nearing capacity, outline the steps you would take for effective landfill closure. What design considerations and environmental safeguards would you implement? 10
- Q6**
- a Propose a method to increase e-waste collection rates in a city with low awareness about e-waste disposal. 05
 - b. Estimate Energy content by using Modified Dulong's formula for $C_{60}H_{100}O_{35}N_2S_1$ 05
 - c. Estimate the number of trips taken by the truck per week to collect the waste of the society having 250 residents. Assume the following data given below: 10
- Occupants per residence = 3.5
Solid waste generation rate = 1.45 kg/person/day
Collection vehicle capacity = 20 m³
Compacted density of solid waste in collection vehicles = 325 kg/m³

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Time: 3hours

Max. Marks: 80

1. Question.No.1 is compulsory.
2. Answer any three questions out of remaining five questions.
3. Assume suitable data wherever required
4. Figures to the right indicate full marks.

Q.1 Attempt any four

(20)

- (i) What are problems faced while erecting of roof truss?
- (ii) Explain Construction sequence in cooling towers.
- (iii) Explain why dome structures are preferred give one example.
- (iv) Explain Erection of overhead tank?
- (v) What is in- situ prestressing in high rise structures?
- (vi) Explain repair of steel structure.

Q.2a What are various types of dredging methods? Explain anyone dredging system in detail

(10)

b) What is seismic retrofitting and how it is achieved

(10)

Q.3 a) Write short note on column jacking and box jacking stating its suitability

(10)

b) Write detailed note with necessary detailed sketch on Pre Engineering Building.

(10)

Q.4 a) List various types of sheet pile and state necessity of steel sheet piles with sketch

(10)

b) Describe in details the factors to be considered and procedure of net zero building.

(10)

Q.5 a) Write in detail about repair of building in terms of leakage, cracks and steel structure.

What test are needed to do undergo structural audit

(10)

b) State factors to be considered while designing green building. What are various grading systems used in India for green building.

(10)

Q.6 Write short notes on **any four**

(20)

- 1) List various types of cofferdam and sketch anyone
- 2) Smart Roads
- 3) Vacuum dewatered flooring
- 4) Stepwise procedure of launching large span girder
- 5) Advances in Construction Industry

Time: 3 hour

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** Why high high-strength steel and high-grade concrete is used in prestressed concrete construction? **05**
- D** Develop the equation for the ultimate shear strength of a rectangular prestressed concrete section (uncracked in flexure). Assume no vertical prestressing is provided. **05**

Q2

- A** Develop the equations for deflection at mid span of a simply supported beam due to prestressing force alone for the following cases. **10**
- 1- Cable has uniform eccentricity along the span of the beam.
 - 2- Cable is linear with maximum eccentricity at mid span and concentric at supports.
- B** An unsymmetrical I-section (top flange 400 mm x 150 mm, web 150 mm x 400 mm, and bottom flange 250 mm x 250 mm) is used to support an imposed load of 10 kN/m over a span of 15 m. The applied pre-stressing force is 825 kN which is located at 65 mm from the soffit of the section at midspan. The parabolic cable is concentric at the supports. Calculate extreme fiber stresses in concrete at quarter span section at service stage. Take the loss ratio as 0.82. **10**

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 12 m long simply supported prestressed concrete beam 150 mm wide and 400 mm deep is subjected to a live load of 5 kN/m. A prestressing force of 220 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 12 m long prestressed concrete beam is designed for an imposed load of 12 kN/m, has rectangular section. Calculate the dimensions of beam, the optimum prestressing force and corresponding eccentricity considering beam is safe in limit state of serviceability cracking and maximum compression in flexure. **10**
- Take $b = D/2$, $\eta = 0.85$, $f_{ct} = f_{cw} = 17 \text{ MPa}$ and $f_{tr} = f_{tw} = -1.2 \text{ MPa}$

- 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 $f_{ck} = 50$ MPa, $f_p = 1600$ MPa, $f_i = 1150$ MPa and $A_{ps} = 450$ mm². **10**

Q5

- A** A 25 m long post-tensioned bridge girder is designed to carry imposed load of 3 kN/m is an unsymmetrical I-section having the following properties; **10**
 $D = 1000$ mm, $\bar{y}_t = 440$ mm, $A = 345000$ mm², $Z_t = 95 \times 10^6$ mm³, $Z_b = 75 \times 10^6$ mm³
 Consider type-1 element and M55 concrete with $f_{ci} = 38.5$ 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 overhang BC is 2 m. The 300 mm wide & 900 mm deep beam supports a uniformly distributed live load 33 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 $\gamma_c = 24$ kN/m³ **10**

Q6

- A** A 9 m long prestressed concrete beam is 300 mm wide and 450 mm deep. This beam is provided with a cable of area 500 mm², located at a constant eccentricity of 50 mm and carrying an initial stress of 1200 N/mm². **10**

Calculate the percentage loss of stress in wires, if

- i- The beam is prestressed.
- ii- The beam is post-tensioned.

Refer Following data

- $E_s = 2 \times 10^5$ MPa
- $E_c = 37 \times 10^3$ MPa
- Creep Coefficient = 1.6
- Total Shrinkage strain = 300×10^{-6} (pretension beam), 200×10^{-6} (posttensioned beam)
- Relaxation loss of stress in steel = 5 % of the initial stress
- Wave effect of cable = 0.0018 / m
- Anchorage slip = 2 mm,
- Jacking from one end only

- B** A 3 m long, concrete beam is 90 mm wide and 180 mm deep. It is prestressed by two wires of 7 mm diameter stressed to 920 N/mm². The wires are curved in parabolic profile with an eccentricity of 37 mm at mid span and concentric at supports. The beam supports a concentrated load of 10 kN at center of span. The modulus of elasticity of concrete is 31 kN/mm². Compute the deflection of the beam at the center of the span under; **10**

- i. Prestress + Self-weight
- ii. Prestress + Self-weight + Live load, assuming 15% loss in prestress due to various causes.

Compare the deflections with the respective permissible limits.

Time: 80 Marks

Time: 4 Hours

Q.1. Workout the quantities of the following items of work by referring Plan & Section shown in figure 1 and 1a. (20)

- Total Volume of Concrete in Plinth Beam and Lintel (Considering 0.15 cm for jams)
- Volume of First-class brickwork in Superstructure with C.M 1:4
- Total Volume of Concrete in all Footings
- Internal plaster on walls and ceiling in CM 1:5, 12 mm thick.

Q2. a) Prepare an approximate estimate for G + 7 RCC Building. Building consists of eight flats on each floor and each flat has a carpet area of 150 square meter. Assume area occupied by walls and columns etc as 10 % of Built up area and area of circulation as 20 % of Built up area. Assume cost of construction as Rs.10000/m². (10)

- What is Contract? Explain valid contract, Void and Voidable contract. (5)
- What is Bar Bending Schedule? Also explain, why it is prepared? (5)

Q 3 a) Estimate the cost of Earthwork for a portion of a road for 400 m length from the following data by mid sectional area method. The formation level at "0 m" Chainage is 52 m. Formation level has a downward Gradient of 1 in 200 m. The formation width of road is 10 m. Side slopes are 2:1 in Banking & 1.5:1 in cutting. The unit rate for cutting and filling are Rs 600 & Rs 550 respectively. (12)

Chainage(m)	0	40	80	120	160	200	240	280	320	360	400
R.L. of Ground (m)	51.0	50.9	50.5	50.8	50.6	50.7	51.2	51.4	51.3	51	50.6

b) Define Specification. Explain its importance and state various purposes served by specification. Draft the detailed specification of first-class Brickwork in superstructure. (8)

- Q 4 a) Explain in detail the procedure of submission and opening of tender. (5)
- b) What is Depreciation? List the methods to determine depreciation of a Building and explain any one of them. (5)

c) What is meant by rate analysis? What are the purposes of doing the Rate Analysis? Perform Rate Analysis for Random Rubble Masonry in CM 1:6 in foundation and plinth (10)

Q 5. a) Total construction cost of a newly constructed Building with 3 floors is Rs 1, 20, 00,000. The Building is constructed on a plot area measuring 600 sq m. The prevailing rate of the plot in the locality is Rs 12000 per sq m. Workout the standard rent per floor per month assuming the following Outgoings.

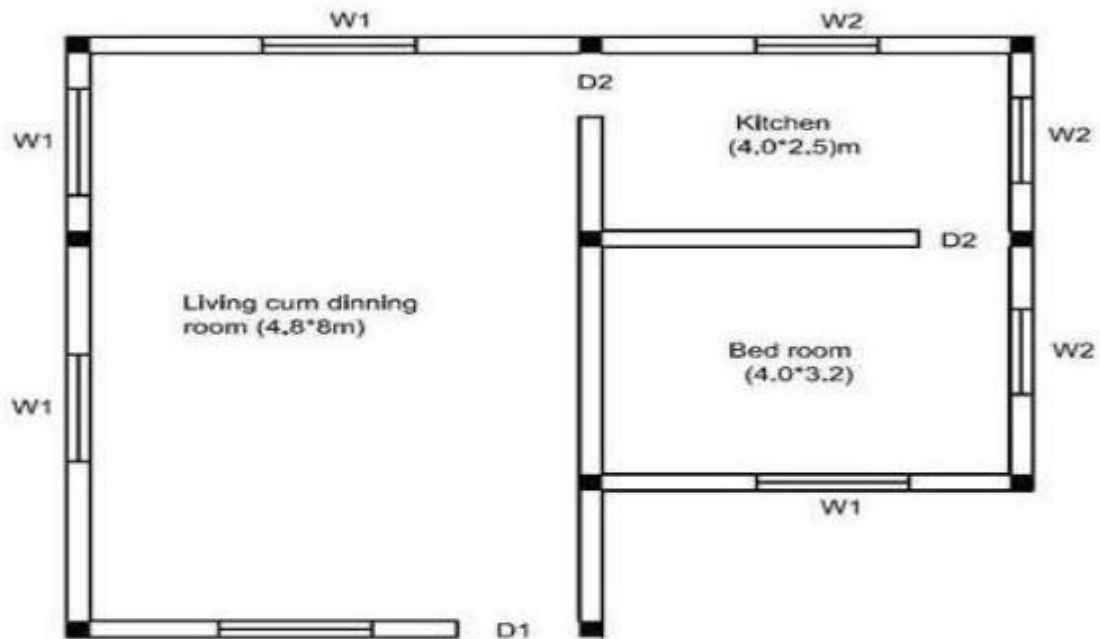
- Municipal taxes @ 25% of Gross rent
- Repairs at 1% of cost of Construction
- Sinking fund @ 5% for 65 years on 90 % of cost of Construction
- Assume 6% as Net Return on of cost of Construction and 5% on cost of Land. (10)

b) Explain Sinking fund and Year's Purchase. (5)

c) Deduction rules for masonry and plastering work as per IS 1200 (5)

Q 6. Write short note on any **FOUR** (20)

- A) Explain Belting Method of valuation of a Property with an example
- B) Write short notes on Defect Liability period and Retention Money
- C) Types of contracts and discuss the suitability of each type of contract.
- D) State true or False with justification: "A lowest tender can be rejected".
- E) Explain Security deposit and Earnest money deposit.



D1=1.2*2.1m
 D2=0.9*2.1m
 W1=1.5*1.5m
 W2=1.2*1.5m
 Wall thickness 0.23m

Fig 1: Plan

Q. No. 1

FIGURE NO. 1.a

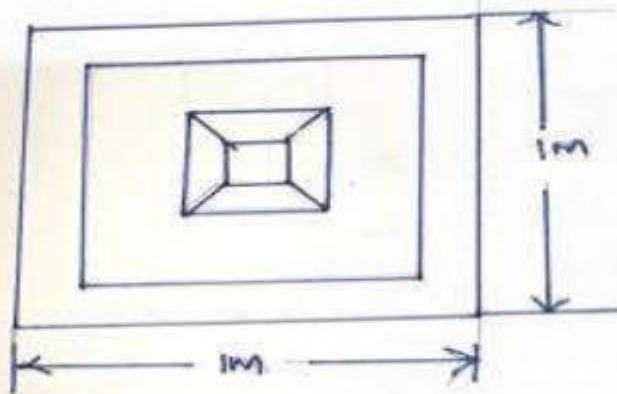
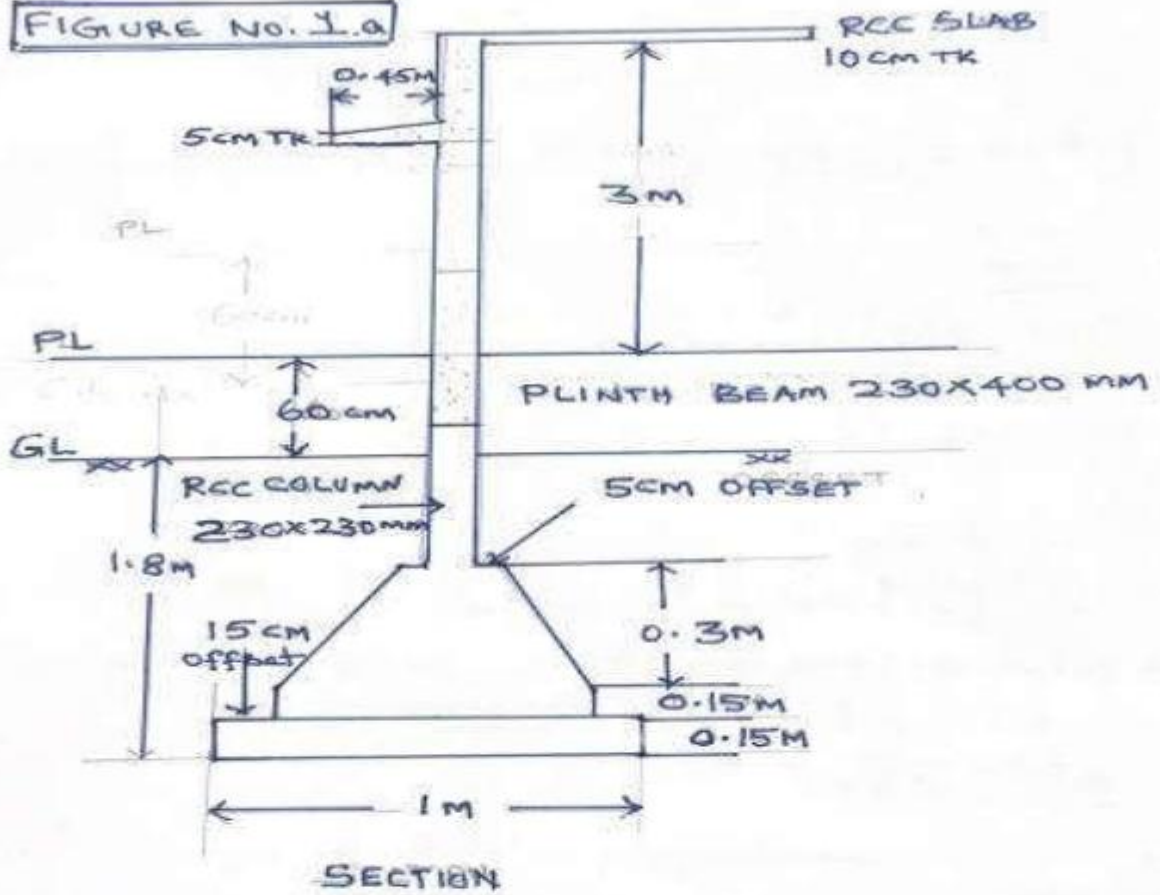


Figure 1.a: Section