

CBCGS SCHEME

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BCV502

Fifth Semester B.E/B.Tech. Degree Examination, Dec.2025/Jan.2026 Geotechnical Engineering

Time: 3 hrs.

Max. Marks: 100

**Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.**

Module – 1			M	L	C
1	a.	With the help of 3 phase diagram, explain void ratio, porosity and degree of saturation.	6	L2	CO1
	b.	Derive the relationship $\gamma_d = \frac{\gamma}{1+w}$.	6	L2	CO1
	c.	A mass of soil coated with a thin layer of paraffin weighs 4.76×10^{-3} kN. When immersed in water it displaces 3.2×10^{-4} m ³ of water. The paraffin is peeled off and found to weigh 1.77×10^{-4} KN. The specific gravity of the soil particles is 2.7 and that of paraffin is 0.9. Determine the void ratio of the soil if its water content is 10%.	8	L3	CO1
OR					
2	a.	With the help of particle size distribution curve define well graded, gap graded and poorly graded soil.	8	L3	CO1
	b.	With neat diagram explain different types of clay minerals.	6	L2	CO1
	c.	A soil sample consisting of particle size ranging from 0.5 mm to 0.01 mm, is put on the surface of still water tank 5m deep. Calculate the time of settlement of the coarsest and finest particles of the sample, to the bottom of the tank. Assume average sp. Gravity of soil particles as 2.66 and viscosity of water as 0.01.	6	L2	CO1
Module – 2					
3	a.	With a neat diagram explain the falling head permeability test.	6	L2	CO1
	b.	Explain the factors affecting permeability of soil.	6	L2	CO4
	c.	In a falling head permeability test, the initial head (t = 0) is 40 cm. The head drops by 5 cm in 10 minutes. Calculate the time required to run the test for the final head to be at 20 cm. If the sample is 6 cm in height and 50 cm ² in cross sectional area, calculate the co-efficient of permeability taking area of sand pipe = 0.5 cm ² .	8	L3	CO4

OR

4	a.	Explain total stress, neutral stress and effective stress.	6	L2	CO4
	b.	What is flow net? Mention its applications.	6	L2	CO4
	c.	A 10 mm thick bed of sand is underlain by a layer of clay of 6 m thickness. The water table which was originally at the ground surface is lowered by drainage to a depth of 4 m. Where upon the degree of saturation above the lowered water table reduces to 20%. Determine the increase in the magnitude of the vertical effective pressure at the middle of the clay layer due to lowering of water table. The saturated unit weights of sand and clay are respectively 20.6 kN/m^3 and 17.6 kN/m^3 and the dry unit weight of sand is 16.7 kN/m^3 .	8	L3	CO4

Module - 3

5	a.	Differentiate between compaction and consolidation of soil.	8	L2	CO2												
	b.	Explain Casagrande's graphical method to determine pre consolidation pressure.	6	L2	CO2												
	c.	The following are the results of proctor compaction test. <table border="1" data-bbox="322 1012 1238 1151"> <tr> <td>Mass of mould + wet soil (g)</td> <td>2925</td> <td>3095</td> <td>3150</td> <td>3125</td> <td>3070</td> </tr> <tr> <td>Water content (%)</td> <td>10.0</td> <td>12.0</td> <td>14.3</td> <td>16.1</td> <td>18.2</td> </tr> </table> <p>Volume of mould = 1000 ml Mass of mould = 1000 gm, Sp gravity of solids = 2.70.</p> <p>i) Find the compaction curve showing the optimum moisture content and maximum dry density. ii) Plot the zero air void line iii) Determine the degree of saturation.</p>	Mass of mould + wet soil (g)	2925	3095	3150	3125	3070	Water content (%)	10.0	12.0	14.3	16.1	18.2	6	L2	CO3
Mass of mould + wet soil (g)	2925	3095	3150	3125	3070												
Water content (%)	10.0	12.0	14.3	16.1	18.2												

OR

6	a.	With neat sketch explain mass spring analogy of consolidation theory.	8	L3	CO2
	b.	Explain preconsolidated, normally consolidated and under consolidated soil.	6	L2	CO2
	c.	The settlement analysis (based on the assumption of the clay layer draining from top and bottom surfaces) for a proposed structure shows 2.5 cm of settlement in 4 years and an ultimate settlement of 10 cm. However, detailed subsurface investigation reveals that there will be no drainage at the bottom. For this situation, determine the ultimate settlement and the time required for 2.5 cm settlement.	6	L2	CO2

Module – 4

7	a.	Classify the shear tests based on drainage condition.	6	L2	CO3						
	b.	Explain the advantages of triaxial shear test over direct shear test.	6	L2	CO3						
	c.	A direct shear test was carried out on a cohesive soil sample and the following result were obtained. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Normal stress (kN/m²)</td> <td>150</td> <td>250</td> </tr> <tr> <td>Shear stress at failure (kN/m²)</td> <td>110</td> <td>120</td> </tr> </table> <p>What would be the deviator stress at failure if a triaxial test is carried out on the same soil with cell pressure of 150 kN/m²?</p>	Normal stress (kN/m ²)	150	250	Shear stress at failure (kN/m ²)	110	120	8	L3	CO3
Normal stress (kN/m ²)	150	250									
Shear stress at failure (kN/m ²)	110	120									

OR

8	a.	Explain Mohr – Coulomb theory.	6	L2	CO3												
	b.	Explain the factors affecting shear strength of soil.	6	L2	CO3												
	c.	A consolidated undrained test was conducted on a clay sample and following results were obtained. <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td>Cell pressure (kN/m²)</td> <td>200</td> <td>400</td> <td>600</td> </tr> <tr> <td>Deviator stress at failure (kN/m²)</td> <td>118</td> <td>240</td> <td>352</td> </tr> <tr> <td>Pure water P_r at failure (kN/m²)</td> <td>110</td> <td>220</td> <td>320</td> </tr> </table> <p>Determine the shear strength parameters with respect to i) Total stress ii) Effective stress and plot Mohr circles.</p>	Cell pressure (kN/m ²)	200	400	600	Deviator stress at failure (kN/m ²)	118	240	352	Pure water P_r at failure (kN/m ²)	110	220	320	8	L3	CO3
Cell pressure (kN/m ²)	200	400	600														
Deviator stress at failure (kN/m ²)	118	240	352														
Pure water P_r at failure (kN/m ²)	110	220	320														

Module – 5

9	a.	Briefly explain local shear failure, punching shear failure and general shear failure.	8	L2	CO4
	b.	Explain effect of water table on bearing capacity.	6	L2	CO4
	c.	A square footing 2.5 m × 2.5 m is built in a homogeneous bed of sand of unit weight 20 kN/m ³ and having an angle of shearing resistance of 36°. The depth of base footing is 1.5m below the ground surface. Calculate the safe load that can be carried by a footing with a factor of safety 3 against shear failure. Take N_c , N_q , N_r values are 65.4, 49.4, 54.	6	L3	CO4

OR

10	a.	Explain primary and secondary settlement.	6	L2	CO4
	b.	Explain assumptions of Terzaghi's bearing capacity theory.	6	L2	CO4
	c.	A saturated soil has a compression index of 0.283., The void ratio at a stress of 12 kN/m ² in 2.05. Compute : i) Change in void ratio if the stress is increased to 21.6 kN/m ² ii) The settlement if the soil stratum is 6 m thick.	8	L3	CO4

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BCV503

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Concrete Technology

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.
3. IS 456:2000 and IS 10262 : 2019 are allowed.*

Module - 1			M	L	C
Q.1	a.	With flow diagram, explain the dry manufacturing process of cement.	10	L2	CO1
	b.	What are Bouge's Compounds? Explain their role in setting and hardening process of cement.	10	L2	CO1
OR					
Q.2	a.	Discuss the manufacturing process and applications of M-sand in the construction industry. Evaluate the advantages and disadvantages compared to Natural Sand.	10	L2	CO1
	b.	What is meant by grading of aggregates? Explain the importance of size, shape and texture with respect to the course aggregate.	10	L2	CO1
Module - 2					
Q.3	a.	Explain the process of i) Batching ii) Mixing iii) Transportation iv) Placing in the manufacturing of concrete.	10	L2	CO2
	b.	Define the workability of concrete. What are the different test methods to determine the workability of concrete? Explain any two methods.	10	L2	CO2
OR					
Q.4	a.	What is the necessity of curing the concrete? Explain the following of curing i) Membrane curing ii) Application of Heat	10	L2	CO2
	b.	Explain segregation and bleeding. What are the effects of segregation and bleeding? How segregation and bleeding can be reduced.	10	L2	CO2
Module - 3					
Q.5	a.	Explain the maturity concept of concrete. What are its practical uses in the concrete industry?	10	L2	CO2
	b.	Define water to cement ratio. Explain how W/C ratio affect the strength of concrete.	5	L2	CO3
	c.	Discuss the concept of Gel/Space ratio. Explain the factors influencing the strength of concrete.	5	L2	CO3

OR						
Q.6	a.	Explain the concept of carbonation in concrete and its potential effects on reinforced concrete structures. Discuss the factors that influence the rate of carbonation and the measures that can be taken to mitigate its harmful effects on concert structures.	10	L2	CO3	
	b.	Discuss about the durability of concrete in Sea water.	10	L2	CO3	
Module – 4						
Q.7	a.	Explain the concept of mix design. Explain the different methods of mix proportioning.	12	L2	CO3	
	b.	Explain the significance of concrete mix design in modern concrete industry.	8	L2	CO3	
OR						
Q.8	Discuss a concrete mix by IS method for M ₃₀ grade concrete as per IS – 10262 – 2019.		20	L2	CO3	
	a)	Grade				: M ₃₀
	b)	Cement				: OPC 53 Grade
	c)	Maximum Nominal size of Aggregate				: 20 mm
	d)	Minimum cement content				: 320 Kg/m ³
	e)	Maximum W/C Ratio				: 0.45
	f)	Workability				: 100mm slump
	g)	Exposure condition				: Severe (Reinforced concrete)
	h)	Method of concrete placing				: Pumping
	i)	Degree of supervision				: Good
	j)	Type of Aggregate				: Crushed Angular
	k)	Maximum cement content				: 450 Kg/m ³
	L)	Chemical admixture				: Super plasticizer
	Test Data for Materials :					
i) Specific gravity of cement = 3.15						
ii) Specific gravity of C.A = 2.74						
iii) Specific gravity of F.A = 2.72						
iv) Water absorption for 1) C.A = 0.5% 2) F.A : 1.5%						
v) Free surface moisture 1) C.A = NIL 2) F.A : 2.0%						
vi) Grading of fine Aggregate : Zone III						
Module – 5						
Q.9	a.	Define RMC. What are the requirements of RMC? Briefly discuss the advantages and disadvantages of RMC.	10	L3	CO4	
	b.	Define Self Compacting Concrete. Explain the properties of self compacting concrete and the need for self compacting concrete in the construction industry.	10	L3	CO4	
OR						
Q.10	a.	Explain the types of fibers used in fiber reinforced concrete and its applications.	10	L3	CO4	
	b.	Explain the following types of special concrete characteristics and circumstances under which they are preferred. i) Geo Polymer Concrete ii) High Performance Concrete.	10	L3	CO4	

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BCV515C

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Solid Waste Management

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.

Module - 1			M	L	C
Q.1	a.	Define the term Solid Waste. Explain the different types of Solid Waste.	10	L2	CO1
	b.	Explain the different classification of Solid Waste.	10	L2	CO1
OR					
Q.2	a.	Appraise the policies and legislative framework of Solid Waste Management.	10	L2	CO1
	b.	Describe the Integrated Solid Waste Management with neat flow chart.	10	L2	CO1
Module - 2					
Q.3	a.	List and explain the various factors affecting the generation of Solid Waste.	10	L2	CO2
	b.	List and explain the methods used to estimate the quantities of waste.	10	L2	CO2
OR					
Q.4	a.	Describe the various physical and chemical properties of Solid Waste characterization.	10	L2	CO2
	b.	Describe the various biological characteristics of waste.	10	L2	CO2
Module - 3					
Q.5	a.	List and explain the different methods of storage systems.	10	L2	CO3
	b.	List and explain the on site processing techniques in Solid Waste.	10	L2	CO3
OR					
Q.6	a.	Distinguish between Hauled container and Stationary container system in collection of Solid Waste.	10	L2	CO3
	b.	Evaluate the different factors considered designing of Hauled Container System.	10	L2	CO3
Module - 4					
Q.7	a.	Define the term Special Waste. Explain the different classification of Special Waste.	10	L2	CO3
	b.	Define the term land fill. Explain the different components used in land fill.	10	L2	CO3
OR					

Q.8	a.	With a neat sketch, explain Lining Material used in landfill site.	10	L2	CO4
	b.	Explain with a neat sketch the Incineration process used in managing waste.	10	L2	CO4
Module – 5					
Q.9	a.	Describe the importance of legislation and discuss the two case studies applied to hazardous waste management system.	10	L2	CO4
	b.	Explain the different techniques processing used in construction and demolition waste.	10	L2	CO4
OR					
Q.10	a.	Explain the importance of Life cycle assessment in Solid Waste Management.	10	L2	CO5
	b.	Define the term B.M.W. Explain the different sources of Bio medical waste.	10	L2	CO5

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BCV601

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026

Design of RCC Structures

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.

2. M : Marks , L: Bloom's level , C: Course outcomes.

3. Use of IS 456 : 2000 Code is permitted.

Module - 1			M	L	C
Q.1	a.	Compare working stress and limit state method.	08	L2	CO1
	b.	Explain : i) Partial safety factor for loads ii) Partial safety factor for materials iii) Characteristic loads iv) Characteristic strength.	12	L2	CO1
OR					
Q.2	a.	Explain the terms: Balanced, Under reinforced and Over – reinforced sections.	06	L2	CO1
	b.	A simply supported beam of rectangular section 200 mm × 450 mm overall is reinforced with 3 no. of 16 mm diameter, having an effective span of 5 m. The beam supports a load of 10 KN/m. Determine the short term deflection using M20 grade concrete and Fe 415 grade steel.	14	L3	CO1
Module - 2					
Q.3	a.	Derive from fundamentals the expression for the area of stress block $0.36 f_{ck} x_u$	08	L4	CO2
	b.	A singly reinforced beam 250 mm × 500 mm in section is reinforced with 4 bars of 16 mm diameter with an effective cover of 50 mm. The effective span of the beam is 6 m. Assuming M20 grade concrete and Fe – 250 grade steel, determine the central concentrated load “p” that can be carried by the beam in addition to its self weight.	12	L3	CO2
OR					
Q.4	a.	Determine the MOR of the beam using the following data. i) Size of the beam = 300 mm × 550 mm ii) Effective Cover = 50 mm iii) Tension reinforcement = 2500 mm ² iv) Compression reinforcement = 500 mm ² Use M25 Grade concrete and Fe – 500 grade steel.	10	L2	CO2
	b.	A RCC beam 300 mm wide and 500 mm deep is reinforced with 4 bars of 16 mm diameter. It is freely supported on effective span of 6 m. Determine the maximum permissible imposed load. Assuming M20 Grade concrete and Fe – 500 grade steel.	10	L4	CO2
Module - 3					
Q.5		Design a singly reinforced SSB of clear span 5 m to support a working live load of 15 KN/m run. Use M20 grade concrete and Fe 415 grade steel. Assume the support thickness is 230 mm.	20	L5	CO3

OR

Q.6	A cantilever beam of 4 m span carries a load of 40 KN/m (Factored load). The width of beam is 230 mm. Design the beam for flexure and shear. Sketch the details of reinforcement. Use M20 concrete and Fe 415 grade steel.	20	L5	CO3
Module – 4				
Q.7	Design a cantilever portion slab projecting 1.5 m from the beam supporting a live load of 3 KN/m ² . Adopt M20 grade concrete and Fe 415 grade steel.	20	L5	CO3
OR				
Q.8	Design a dog-legged staircase of an office building in a room measuring 2.8 m × 5.8 m clear. The vertical distance between the floors is 3.6 m. The width of the flight is to be 1.25 m. Allow a live load of 3KN/m ² . Sketch the details of reinforcement. Use M20 grade concrete and Fe 415 grade steel. Assume the stairs are supported on 230 mm walls at the end of the outer edges of the landing slabs.	20	L5	CO3
Module – 5				
Q.9	A column of size 300 mm × 400 mm has an effective length of 3.6 m and is subjected to $P_u = 1100$ KN and $M_u = 150$ KN – m about the major axis. Design the column using M25 grade concrete and Fe 415 grade steel. Providing the steel i) on two sides ii) On four sides Assume $d' = 60$ mm.	20	L5	CO3
OR				
Q.10	Design a square footing to carry a column load of 1200 KN from a 400 mm square column. The SBC of soil is 120 KN/m ² . Use M20 grade concrete and Fe 415 grade steel.	20	L3	CO3

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BCV602

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Irrigation Engineering and Hydraulic Structures

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course/outcomes.*

Module – 1			M	L	C
Q.1	a.	List various types of flow irrigation and explain any one type in detail.	06	L2	CO2
	b.	What is Bandhara Irrigation? What are the advantages and disadvantages.	06	L2	CO2
	c.	Define the term irrigation. List and explain various benefits and ill effects of Irrigation.	08	L2	CO2
OR					
Q.2	a.	Find the depth of irrigation water required in order to ensure sufficient availability of moisture uniform growth of crop for the following data: permanent wilting coefficient = 20% ; Field capacity of soil = 36% ; Density of soil = 1.75 g / cc ; Effective depth of root zone = 800 mm ; Daily consumption use of water = 40 mm. Also determine frequency of watering. Assume OMC as 75% of available moisture.	08	L3	CO2
	b.	List and explain various factors affecting duty.	06	L2	CO2
	c.	Define Duty, Delta and Base period. Derive an expression to establish relation between Duty, Delta and Base period.	06	L2	CO2
Module – 2					
Q.3	a.	With help of neat sketch, explain various storage zones of reservoir.	08	L2	CO2
	b.	Briefly explain the investigations to be carried out for reservoir planning.	06	L2	CO2
	c.	With aid of a neat sketch, explain how economical height of a dam is determined.	06	L2	CO2
OR					
Q.4	a.	Enumerate the points that must be considered in aligning an irrigation canal.	06	L2	CO2
	b.	Write a detailed note on classification of canals.	06	L2	CO2
	c.	Explain stepwise Lacey's procedure for designing unlined canals.	08	L3	CO2
Module – 3					
Q.5	a.	With help of neat sketch, explain different forces acting on Gravity Dam.	10	L2	CO1
	b.	Derive an expression for the limiting height of a Low Gravity Dam.	10	L3	CO1
OR					
Q.6	a.	List and explain various advantages and disadvantages of gravity dams.	10	L2	CO1
	b.	Explain various modes of failure of gravity dam and mention their remedies.	10	L3	CO1
Module – 4					
Q.7	a.	With aid of neat sketches, explain different causes of failure of earth dams.	10	L3	CO1
	b.	List different types of spillways and explain any one type of spillway in detail.	10	L3	CO1

OR

Q.8	a.	Describe the design principles that are involved in design of ogee spillway.	10	L3	CO1
	b.	With help of neat sketches, explain various types of earth dams.	10	L3	CO1

Module – 5

Q.9	a.	Write a detailed note on Bligh's creep theory. Also mention the limitations of this theory.	10	L3	CO3
	b.	Draw a neat sketch of layout of a diversion head work and indicate various components of the system. Also mention the function of each component.	10	L3	CO3

OR

Q.10	a.	Briefly outline Khosla's theory on the design of weirs on permeable foundation. Enumerate the various corrections that are needed in the application of this theory.	10	L3	CO3
	b.	Describe how does Khosla's theory differ from Bligh's theory with regard to design of weir on permeable foundation.	10	L3	CO3

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BCV613B

Sixth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026

Design of Formwork and Scaffolding

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module - 1			M	L	C
Q.1	a.	List and explain the various classification and benefits of form work.	10	L2	CO1
	b.	Write a note on selection of formwork and formwork materials.	10	L1	CO1
OR					
Q.2	a.	List the objectives of formwork, briefly explain the areas of competitiveness.	10	L2	CO1
	b.	Explain briefly on assembling and de-shuttering of formwork system.	10	L2	CO1
Module - 2					
Q.3	a.	Explain the importance of formwork planning and monitoring.	10	L2	CO2
	b.	List the various steps followed involved in slab formwork.	10	L2	CO2
OR					
Q.4	a.	Explain the concept of basics of formwork design.	10	L2	CO2
	b.	List out the various design assumptions and design methods considered in the formwork.	10	L2	CO2
Module - 3					
Q.5	a.	Explain in detail on schedule of formwork.	10	L2	CO3
	b.	What is the role of mobilization distribution in formwork? Explain in brief.	10	L1	CO3
OR					
Q.6	a.	Explain the purpose of BOQ formwork.	10	L2	CO3
	b.	List the key areas in cost optimization in formwork.	10	L2	CO3
Module - 4					
Q.7	a.	List the advantages and limitations of Special formwork.	10	L2	CO4
	b.	Explain the following : i) Aluminum formwork ii) Drawing and Components.	10	L2	CO4
OR					
Q.8	a.	Explain the various steps involved in shuttering and de-shuttering special formwork.	10	L2	CO4
	b.	Explain the detail of modular scaffolding.	10	L2	CO4
Module - 5					
Q.9	a.	List the various types of failures in formwork.	10	L2	CO1
	b.	Explain the following : i) Formwork assembly for wall ii) Form work for column panels	10	L2	CO1
OR					
Q.10	a.	List the various steps involved in formwork building and erection.	10	L2	CO1
	b.	Explain the process of formwork erection and safety.	10	L2	CO1
