AJ Institute of Engineering and Technology Mangaluru.

VTU Question Papers

CIVIL ENGINEERING
Make-Up Exam
III to VIII Semester

2022 SCHEME

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CBCS SCHEME - Make-Up Exam

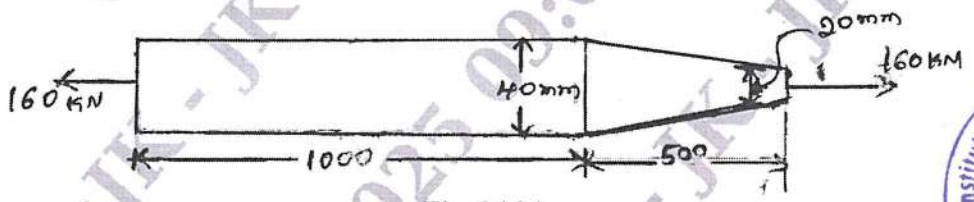
USN | | | | | | | | | | |

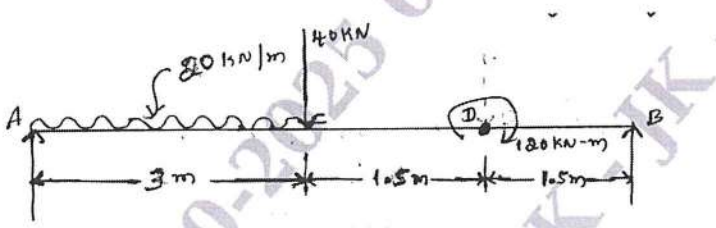
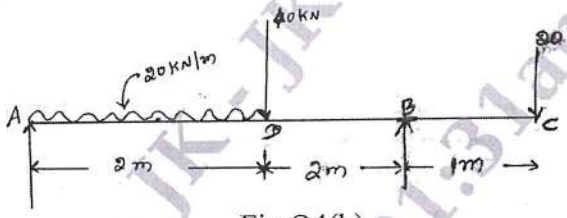
BCV301

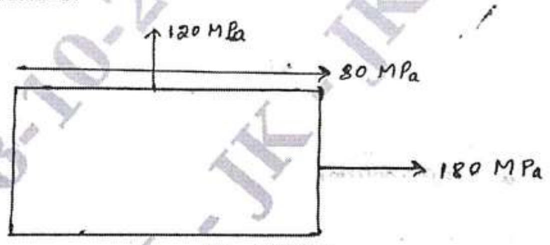
Third Semester B.E/B.Tech. Degree Examination, June/July 2025
Strength of Materials

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. Missing data, if any, may be suitably assumed.

		Module – 1	M	L	C
1	a.	Drive the expression of circular tapering bar subjected to an axial load P.	6	L1	CO1
	b.	Define the following terms : i) Modulus of rigidity ii) Modulus of elasticity iii) Bulk modulus iv) Volumetric strain.	4	L1	CO1
	c.	A 1.5 m long steel bar is having uniform diameter of 40 mm for a length of 1m. In the next 0.5 m its diameter gradually reduces from 40 mm to 20 mm as shown in Fig.Q1(c). Determine the elongation of this bar when subjected to an axial tensile load of 160 kN, given E = 200 GN/m^2.  Fig.Q1(c)	10	L3	CO1
		OR			
2	a.	Derive the relationship between modulus of elasticity. Module of rigidity and Poisson's ratio.	6	L3	CO1
	b.	A 18 mm diameter steel rod passes centrally through a copper tube of 26 mm, diameter (internal) and 38 mm diameter (External). The rod is 2.6 m long and is closed, at each ends by rigid plates of negligible thickness. The nuts are tightened lightly on the protecting parts of the rod. If the temperature of assembly is raised by 80°C. Calculate thermal stresses induced in copper and steel. Take $\alpha_{cu} = 17.5 \times 10^{-6}$/°C, $\alpha_s = 12 \times 10^{-6}$/°C, $E_{st} = 210$ GPa, $E_{cu} = 1.05 \times 10^5$ N/mm^2.	10	L2	CO1
	c.	Define the principle of superposition and thermal stress.	4	L1	CO1

		Module – 2			
3	a.	What are the different types of beams? Explain with neat sketches.	6	L1	CO2
	b.	Define : i) SFD ii) BMD iii) Hogging bending moment iv) Sagging bending moment.	4	L1	CO2
	c.	For the simply supported beam shown in Fig.Q3(c). Draw SFD and BMD, also find the point of zero shear and its corresponding bending moment.  Fig.Q3(c)	10	L3	CO2
		OR			
4	a.	Derive the relationship between load, shear force and bending moment.	6	L2	CO2
	b.	Draw BMD and SFD for the overhanging beam shown in Fig.Q4(b). Clearly indicate the portion of contra flexure.  Fig.Q4(b)	14	L3	CO2
		Module – 3			
5	a.	Derive bending equation with usual notation.	6	L3	CO3
	b.	What are the assumptions of simple bending?	4	L1	CO3
	c.	A circular pipe of external diameter 70 mm and thickness 8 mm is used as a simple supported beam over an effective span of 2.5 m. Find the maximum concentrated loads that can be applied at the centre of the span, if the permissible stress in the tube is 150 N/mm^2.	10	L3	CO3
		OR			
6	a.	List the assumptions made in pure torsion.	4	L1	CO3
	b.	Calculate the maximum intensity of shear stress induced and the angle of twist produced in degrees in solid shaft of 100 mm diameter, 10 m long, transmitting 112.5 KW at 150rpm. Take G = 82 kN/mm^2.	6	L2	CO3
	c.	A solid shaft is required to transmit 330 KW at 120 rpm. The shear stress of the material must not exceed 80 MN/m^2. i) Find the diameter required ii) If the shaft is replaced by a hollow one with a diameter ratio of 3 : 5 and the maximum shear stress remaining unchanged, calculate the percentage saving in weight that could be obtained.	10	L3	CO3

		Module – 4			
7	a.	A simply supported beam of 5 m span is subjected to a counteracted load of 50 KN at 3 m from left support, calculate : i) The position and the value of maximum deflection ii) The slope at mid-span iii) Deflection at the load point Take EI = 15 MN m^2.	10	L3	CO4
	b.	Define deflection and curvature.	4	L1	CO4
	c.	Derive moment – curvature equation.	6	L2	CO4
		OR			
8	a.	Derive an equation for Euler's buckling load for a long column whose ends are hinged.	6	L3	CO4
	b.	State the limitations of Euler's theory.	4	L1	CO4
	c.	A hollow cast from iron column whose outside diameter is 200 mm and thickness of 20 mm is 4.5 m long and is fixed at both ends. Calculate the safe load by Rankine's formula using a factor of safety of 2.5. Find the ratio of Euler's to Rankine's loads. Take E = 1 × 10^5 N/mm^2 and Rankine constant = $\frac{1}{1600}$ for both ends pinned case. Take σ_c = 550 N/mm^2.	10	L3	CO4
		Module – 5			
9	a.	Differentiate between thin cylinders and thick cylinders.	4	L1	CO5
	b.	Differentiate between Hoop stress and longitudinal stress.	6	L2	CO5
	c.	The state of at a point on a strained material is 120 MPa and is as shown in Fig.Q9(c). Determine : i) The direction of principal planes ii) The magnitude of principal stresses iii) The magnitude of maximum shear stress and its directions. Sketch the stresses and planes.  Fig.Q9(c)	10	L3	CO4
		OR			
10	a.	Define : i) Principal stress ii) Principal plane.	4	L1	CO5
	b.	Derive Lame's equation with usual notation.	6	L3	CO5
	c.	Determine the maximum and minimum hoop stress across the section of a pipe of 400 mm internal diameter and 100 mm thick, when the pipe contains a fluid at a pressure of 80 N/mm^2. Also sketch the radial pressure distribution and hoop stress distribution.	10	L3	CO5

CBCS SCHEME - Make-Up Exam

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BCV304

Third Semester B.E/B.Tech. Degree Examination, June/July 2025
Water Supply and Waste Water 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.	Explain the need of planned water supply scheme in present day community life.	7	L2	CO1
	b.	The population of a city in three consecutive years i.e. 2001, 2011 and 2021 is 80,000, 2,50,000 and 4,80,000 respectively. Determine (i) The saturation population (ii) The equation of logistic curve (iii) The expected population in 2031.	9	L3	CO1
	c.	Enumerate the fire demand in water supply.	4	L2	CO1
		OR			
2	a.	What is meant by design period? Discuss the factors affecting design period.	6	L2	CO1
	b.	The population statistics of a Town are given below : Years: 1991 | 2001 | 2011 | 2021 Population: 80,000 | 1,20,000 | 1,68,000 | 2,28,000 Estimate probable population in the year 2051 by geometrical and incremental increase method.	8	L3	CO1
	c.	Enumerate the various physical and chemical characteristics of water and highlight the importance of each parameter.	6	L2	CO1
		Module – 2			
3	a.	Briefly explain the complete treatment process of a water supply scheme with flow chart.	9	L2	CO2
	b.	What is Aeration? Explain the types of aerators.	5	L2	CO2
	c.	What is optimum dosage of coagulant? Explain how it is determined in the laboratory.	6	L2	CO2
		OR			
4	a.	Explain :(i) Detention period (ii) Surface loading (iii) Basin dimensions related to design of sedimentation tank	6	L2	CO2
	b.	Explain the theory of filtration.	6	L2	CO2
	c.	Design of 12 slow sand filter beds for a population of 2,50,000. Rate of filtration – 500 Lt/hr/m^2. Assume the data as follows per capita demand – 135 LPCD. Length of each bed = 2.5 times the breadth, Peak demand = 1.5 Avg demand.	8	L3	CO2

		Module – 3			
5	a.	Explain the zeolite processes of wate softening with sketch. Write down the relevant chemical equation.	**10**	**L2**	**CO3**
	b.	What is meant by disinfection of water? Discuss the theory of disinfection by Chlorine.	**6**	**L2**	**CO3**
	c.	Explain break point chlorination graphically.	**4**	**L3**	**CO3**
		OR			
6	a.	Explain briefly the different types of water carriage system.	**10**	**L2**	**CO3**
	b.	Calculate 3 day BOD and ultimate BOD of a sample of sewage for the following data : (i) DO of Raw sewage 0.6 mg/L (ii) DO of dilution water 6 mg/L (iii) DO of mix dilution water and sewage after 3 days of incubation 1.1 mg/L (iv) Dilution ratio is 3% (v) Assume K = 0.12/day at test temperature.	**10**	**L3**	**CO3**
		Module – 4			
7	a.	Write the flow diagram of Treat Municipal waste water and indicate the importance of each Photon unit.	**10**	**L2**	**CO4**
	b.	Design a primary sedimentation tank of circular cross section, for a sewage of 10 MLD, detention period of 2 hours and assume surface loading rate to be 30 m^3/m^2/day.	**10**	**L3**	**CO4**
		OR			
8	a.	Explain the working of Grit chamber and skimming tank with figures.	**10**	**L2**	**CO4**
	b.	Mention the modification of activated sludge processes. Explain any two of them.	**10**	**L2**	**CO4**
		Module – 5			
9	a.	With the help of a neat sketch, explain the working of Trickling filters.	**10**	**L2**	**CO5**
	b.	Write note on : (i) Bio Towers (ii) Rotating Biological contactor.	**10**	**L2**	**CO5**
		OR			
10	a.	With flow diagram, explain the sludge treatment unit operation and processes.	**10**	**L2**	**CO5**
	b.	With neat sketch, explain the stages in Anaerobic Digestion of sludge.	**10**	**L2**	**CO5**

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CBCS SCHEME - Make-Up Exam

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BCV306D

Third Semester B.E./B.Tech. Degree Examination, June/July 2025
Fire Safety in Buildings

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.	What is Combustion? Explain the types of combustion.	10	L1	CO1
	b.	List the fire fighting equipments and explain it briefly.	10	L1	CO1
		OR			
Q.2	a.	What is Ventilation? Explain it briefly with effects and types of ventilations.	10	L1	CO1
	b.	Define Fire. Explain the effects of common construction martials used in buildings.	10	L1	CO1
		Module – 2			
Q.3	a.	Explain briefly refuse area and mention the rules for reuse area.	10	L2	CO2
	b.	Explain briefly fire detection and suppression system.	10	L2	CO2
		OR			
Q.4	a.	List the lifts and explain it briefly of lifts used in buildings.	10	L2	CO2
	b.	List the difference between lifts and escalators.	10	L2	CO2
		Module – 3			
Q.5	a.	List and explain the various types of water demand in a city.	10	L3	CO3
	b.	What are the factors affecting per capita demand?	10	L3	CO3
		OR			
Q.6	a.	Explain briefly the different types of pipe networks.	10	L3	CO3
	b.	Write short notes on : i) Check valve ii) Pressure relief valve iii) Flow control valve iv) Diversity factor.	10	L3	CO3
		Module – 4			
Q.7	a.	What is HVAC? Explain the types of HVAC systems.	10	L3	CO4
	b.	Explain it briefly the classification of electric power distribution system.	10	L3	CO4
		OR			
Q.8	a.	What is intelligent buildings? Mention the advantages and disadvantages of intelligent building.	10	L3	CO4
	b.	Explain the types of maintenance works in buildings.	10	L3	CO4
		Module – 5			
Q.9	a.	Explain it briefly the health evaluation of buildings, diagnosis of building by visual survey.	10	L3	CO5
	b.	Explain briefly the effect of corrosion in buildings and two forms of alkali aggregate reaction.	10	L3	CO5
		OR			
Q.10	a.	Distinguish between Repair, Rehabilitation.	10	L3	CO5
	b.	What is NDT? Explain the different forms of NDT.	10	L3	CO5

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CBCS SCHEME - Make-Up Exam

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BCV401

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025
Analysis of 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. Missing data, if any, may be suitably assumed.
4. Write legibly.

		Module – 1	M	L	C
Q.1	a.	Briefly explain different forms of structures.	4	L2	CO1
	b.	Distinguish between determinate and indeterminate structures.	6	L2	CO1
	c.	Determine degree of static and kinematic indeterminacy for the structures shown in Fig.Q1(c).	10	L3	CO1

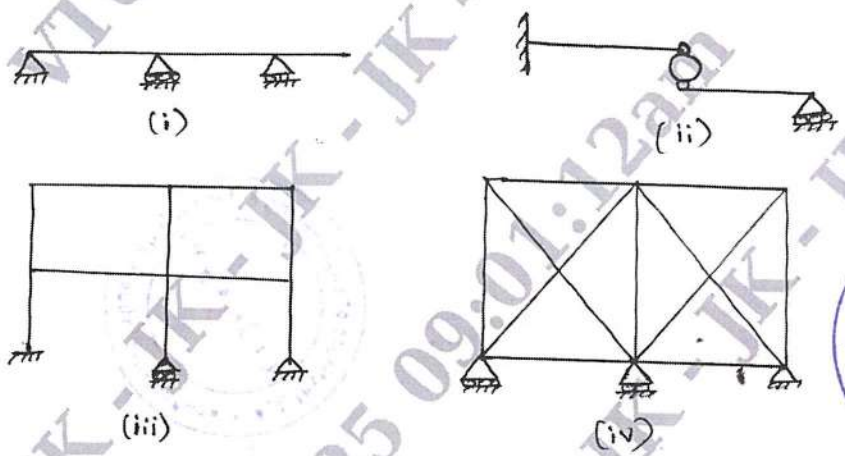


Fig.Q1(c)

OR

Q.2		Determine the forces in all the members of the truss shown in Fig.Q2 and indicate the magnitude and nature of the forces on the diagram of truss.	20	L3	CO1

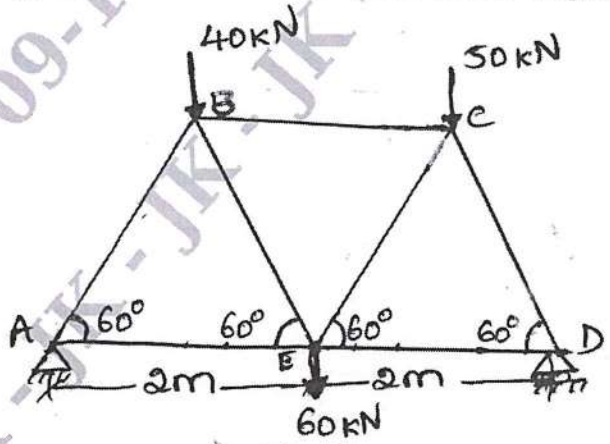
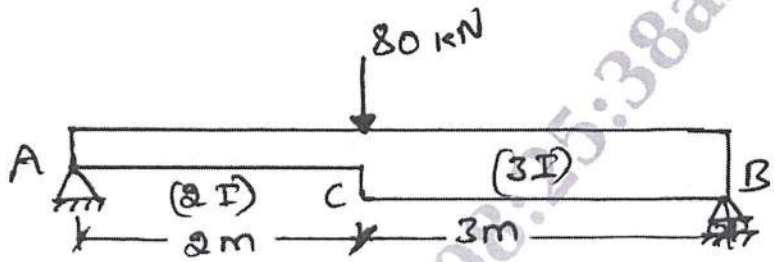
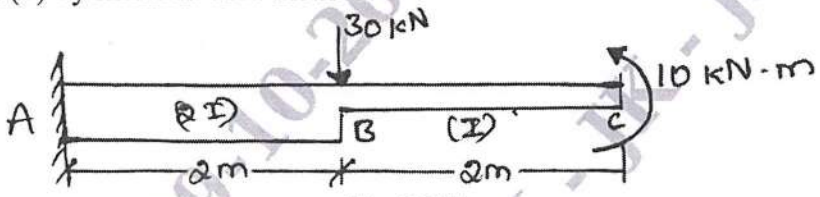
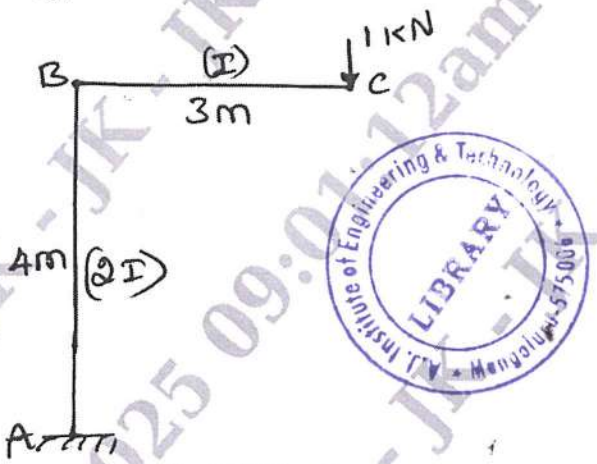
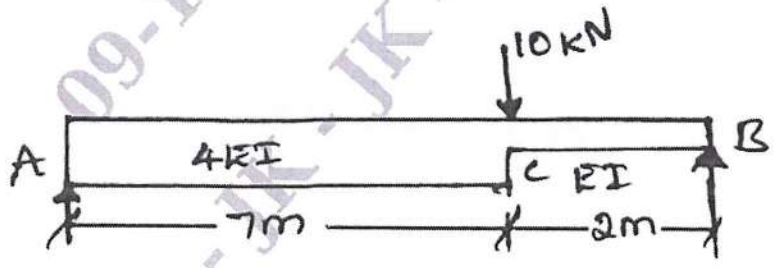


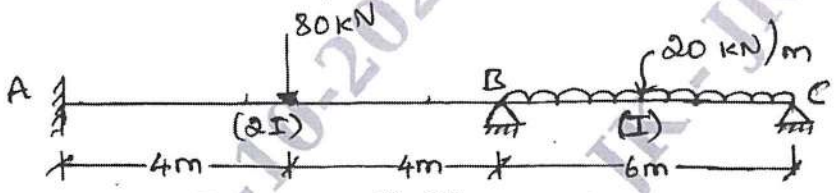
Fig.Q2

		Module – 2			
Q.3	**a.**	Determine maximum slope and deflection for the simply supported beam shown in Fig.Q3(a) by moment area method.  Fig.Q3(a)	**10**	**L3**	**CO2**
	b.	Calculate slope and deflection for the cantilever beam shown in the Fig.Q3(b) by moment area method.  Fig.Q3(b)	**10**	**L3**	**CO2**
		OR			
Q.4	**a.**	Determine the vertical deflection at point C for the frame shown in the Fig.Q4(a) by strain energy method.  Fig.Q4(a)	**10**	**L3**	**CO2**
	b.	Determine deflection under the load for the simply supported beam shown in Fig.Q4(b) by Castigliano's theorem.  Fig.Q4(b)	**10**	**L3**	**CO2**
		Module – 3			
Q.5		A three hinged parabolic arch hinged at supports and crown has a span of 24 m and central rise 4 m. It carries a concentrated load of 50 kN at 18 m from left support and udl of 30 kN/m over left half portion. Determine normal thrust, radial shear at 6 m from left support and draw B.M.D.	**20**	**L3**	**CO3**

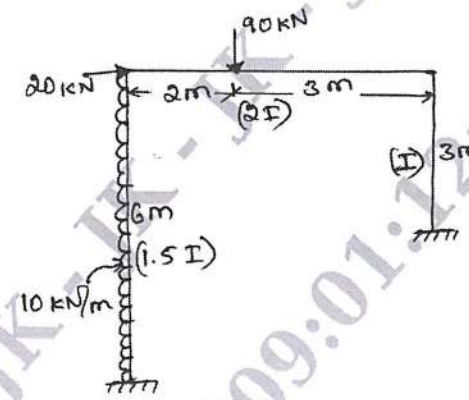
OR

Q.6		A cable of span 120 m and dip 10 m carries a load of 6 kN/m of horizontal span. Find the maximum and minimum tension in the cable and the inclination of cable at the support. Find the forces transmitted. i) If cables passes over a smooth pulleys ii) If cable passes over a saddle on top of pier. The anchor cable is at 30° to the horizontal. Maximum permissible stress is 200 N/mm^2 and height of pier is 15 m, determining moment, length of cable and size of cable.	**20**	**L3**	**CO3**

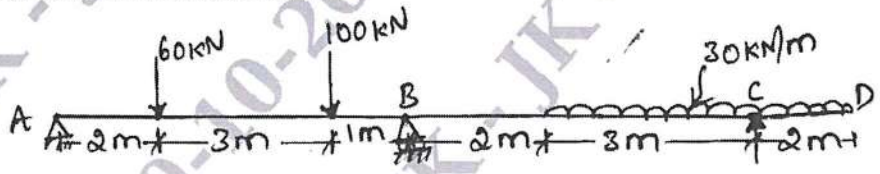
Module – 4

Q.7		Analyze the beam shown in Fig.Q7 by slope deflection method. Relative to support A support 'B' sinks by 1 mm and support C rises by 0.5 mm. Take EI = 30000 kN-m^2. Draw SFD, BMD and elastic curve.  Fig.Q7	**20**	**L3**	**CO4**

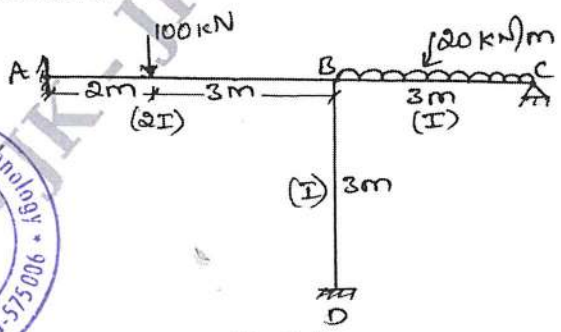
OR

Q.8		Analyse the frame shown in Fig.Q8 by slope deflection method. Draw BMD and elastic curve.  Fig.Q8	**20**	**L3**	**CO4**

Module – 5

Q.9		Analyse the beam shown in Fig.Q9 by moment distribution method. Draw SFD, BMD and Elastic curve.  Fig.Q9	**20**	**L3**	**CO5**

OR

Q.10		Analyse the frame shown in Fig.Q10 by moment distribution method. Draw BMD and Elastic curve.  Fig.Q10	**20**	**L3**	**CO5**

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CBCS SCHEME - Make-Up Exam

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BCV402

Fourth Semester B.E./B.Tech. Degree Examination, June/July 2025
Fluid Mechanics and Hydraulics

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 following : i) Specific Gravity ii) Specific Volume iii) Dynamic Viscosity iv) Kinematic Viscosity	4	L1	CO1
	b.	State and prove Pascal's law.	8	L1	CO1
	c.	The space between two square flat parallel plates is filled with oil. Each side of the plate is 60 cm. The thickness of the oil film is 12.5 mm. The upper plate, which moves at 2.5 metre per sec requires a force of 9.81 N to maintain the speed. Determine : i) The dynamic viscosity of the oil in poise ii) The kinematic viscosity of the oil in stokes, if the specific gravity of the oil is 0.95.	8	L2	CO1
		OR			
Q.2	a.	Define the following : i) Ideal fluid ii) Real fluid iii) Newtonian fluid iv) Non-Newtonian fluid.	4	L1	CO1
	b.	Explain the terms capillarity and surface tension properties of a fluid.	8	L1	CO1
	c.	A U-tube manometer is used to measure the pressure of water in a pipe line, which is in excess of atmospheric pressure. The right limb of the manometer contains mercury and is open to the atmosphere. The contact between water and mercury is in the left limb. Determine the pressure of water in the main line, if the difference in level of mercury in the limbs of U-tube is 10cm and the free surface of mercury is in level with centre of the pipe. If the pressure of water in pipeline is reduced to 9810 N/m^2, Calculate the new difference in the level of mercury. Sketch the arrangements in both the cases.	8	L1	CO1
		Module – 2			
Q.3	a.	Define velocity potential and stream function.	4	L1	CO2
	b.	Derive an expression for Bernoulli's theorem with suitable sketches.	8	L2	CO2
	c.	A horizontal venturimeter with inlet diameter 20 cm and throat diameter 10 cm is used to measure the flow of water. The pressure at inlet is 17.658 N/cm^2 and vacuum pressure at the throat is 30 cm of mercury. Determine the discharge through venturi meter. Take $C_d = 0.98$.	8	L2	CO2

		OR			
Q.4	**a.**	Mention the applications and limitations of having venturi meter.	**4**	**L1**	**CO2**
	b.	Derive an expression for the discharge through an orifice meter..	**8**	**L2**	**CO2**
	c.	An orifice-meter with orifice diameter 10 cm is inserted in a pipe of 20 cm diameter. The pressure gauge fitted upstream and downstream of the orifice-meter gives readings of 19.62 N/cm^2 and 9.81 N/cm^2 respectively. The coefficient of discharge of the meter is 0.60. Determine the discharge of water through the pipe.	**8**	**L2**	**CO2**
		Module – 3			
Q.5	**a.**	What are hydraulic co-efficients? Explain briefly.	**4**	**L2**	**CO3**
	b.	Derive an expression for the loss of head due to sudden contraction of the pipe.	**8**	**L2**	**CO3**
	c.	Three pipes of lengths 800 m, 600 m and 300 m having diameters 400 mm, 300 mm and 200 mm respectively are connected in series. The ends of the compound pipes are connected to two tanks, whose water surface levels are maintained at a difference of 15 m. Determine the rate of flow of water through the pipe, if f = 0.005. What will be the diameter of a single pipe of length 1700 m and f = 0.005, which replaces three pipes.	**8**	**L2**	**CO3**
		OR			
Q.6	**a.**	Mention the classifications of orifice and mouth piece.	**4**	**L1**	**CO3**
	b.	Derive an expression for the discharge over a rectangular notch/weir in terms of head of water over the crest of the weir.	**8**	**L2**	**CO3**
	c.	Water flows over a rectangular weir 1 m wide at a depth of 150 mm and afterwards passes through a triangular right angled weir. Taking C_d for the rectangular and triangular weir as 0.62 and 0.59 respectively. Determine the depth of flow over the triangular weir.	**8**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Mention the different classification of open channel flow.	**4**	**L1**	**CO4**
	b.	Derive an expression for a trapezoidal channel section in an open channel flow having most economical condition.	**8**	**L2**	**CO4**
	c.	A trapezoidal channel with side slopes of 3 horizontal to 2 vertical has to be designed to convey $10 m^3/s$ at a velocity of 1.5 m/s, so that the amount of the concrete lining for the bed and sides is minimum. Determine : i) The wetted perimeter ii) Slope of the bed, if Manning's constant N = 0.014 in Manning's formula.	**8**	**L2**	**CO4**

		OR			
Q.8	**a.**	Mention the assumption made during the gradually varied flow.	**4**	**L1**	**CO4**
	b.	Derive an expression for loss of energy due to hydraulic jump.	**8**	**L2**	**CO4**
	c.	The depth of flow of water, at a certain section of a rectangular channel of 2 m wide, is 0.3 m. The discharge through the channel is $1.5 m^3/s$. Determine whether a hydraulic jump will occur and if so, find its height and loss of energy per kg of water.	**8**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Differentiate between impulse and reaction turbine.	**4**	**L1**	**CO5**
	b.	Derive an expression for the force exerted on a curved plate or vane, when the plate is moving in the direction of the jet.	**8**	**L1**	**CO5**
	c.	A Jet of water 60 mm in diameter, strikes a curved vane at its centre with a velocity of 18 m/s. The curved vane is moving with a velocity of 6 m/s in the direction of jet. The jet deflected through an angle of 165°. Assuming the plate to be smooth, find : i) Thrust on the plate in the direction of jet. ii) Power of the jet and iii) Efficiency of the jet	**8**	**L2**	**CO5**
		OR			
Q.10	**a.**	Mention the advantages and disadvantages of a Francis turbine over a Pelton wheel turbine.	**4**	**L1**	**CO5**
	b.	Explain briefly the classification of heads and efficiencies of a centrifugal pump.	**8**	**L1**	**CO5**
	c.	A Pelton wheel is to be designed for the following specifications. Power (Brake or Shaft) = 9560 kW Head = 350 meters Speed = 750 rpm Overall efficiency = 85% Jet diameter not to exceed 1/6 the wheel diameter Determine the following : i) The wheel diameter ii) Diameter of the jet iii) The number of jets required Take $C_v = 0.985$ and Speed ratio = 0.45.	**8**	**L2**	**CO5**

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CBCS SCHEME - Make-Up Exam

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BCV403

Fourth Semester B.E/B.Tech. Degree Examination, June/July 2025
Transportation 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.
3. Missing data, if any, may be suitably assumed. .

		Module – 1	M	L	C
1	a.	List the various major recommendations of Jayakar Committee. How this helped in road development in India.	6	L1	CO1
	b.	List the various factors affecting highway alignment. Explain these with neat sketches.	6	L1	CO1
	c.	Calculate the stopping sight distance for a vehicle moving with a design speed of 80 kmph on a level road and on a gradient of 1 in 100.	8	L2	CO1
		OR			
2	a.	Explain the various practical design steps in the calculation of super deviation on a horizontal curve.	6	L1	CO1
	b.	With neat sketches, explain various road patterns.	6	L1	CO1
	c.	An ascending gradient of 1 in 100 meets a descending gradient of 1 in 120. Design the length of summit curve to be designed for a vehicle moving with a speed of 80 kmph so as to have an OSD of 470 m.	8	L2	CO1
		Module – 2			
3	a.	List the various properties of coarse aggregate and the tests to be conducted to determine each property.	6	L2	CO2
	b.	Explain the various differences between flexible pavement and rigid pavement.	6	L2	CO2
	c.	The maximum quantity of water expected in one of the open longitudinal drains on clayey soil is 1.0 m^3/sec. design the cross section and longitudinal slope of the trapezoidal drain assuming the bottom width of the trapezoidal section and cross slope suitably. The allowable velocity of flow in the drain is 1.2 m/sec and Manning's roughness coefficient is 0.02.	8	L3	CO2
		OR			
4	a.	List and explain various describable properties of subgrade soil.	6	L2	CO2
	b.	What are the various factors governing pavement design. List and explain all of them.	6	L1	CO2
	c.	Discuss the importance of highway drainage.	8	L2	CO2

Module – 3

5	a.	Explain reaction time and PIEV theory with sketch.	6	L1	CO3
	b.	Define PCU. List and explain the various factors governing PCU at different locations.	6	L1	CO3
	c.	Following data were obtained from the spot speed studies. Determine : i) Upper and lower limits of speed for regulation ii) Design speed for checking the geometric design elements of the highway.	8	L1	CO3

Speed range (kmph)	Number of vehicles	Speed range (kmph)	Number of vehicles
5 – 10	230	30 – 35	430
10 – 15	375	35 – 40	290
15 – 20	500	40 – 45	110
20 – 25	680	45 – 50	25
25 – 30	525	50 – 55	8
		55 – 60	1

OR

6	a.	List the objectives of : i) O and D studies ii) Accident studies.	6	L1	CO3
	b.	List and explain various types of traffic signs, with neat sketches.	6	L2	CO3
	c.	A vehicle of weight 2.0 tonnes skids through a distance equal to 40 m before colliding with another parked vehicle of weight 1.0 tonne, and after collision, skids through 12 m before stopping. Calculate the initial speed of the moving vehicle. Assume coefficient of friction as 0.5.	8	L3	CO3

Module – 4

7	a.	Explain coning of wheels and tilting of rails, with neat sketch.	6	L2	CO4
	b.	Draw a typical cross section of permanent way and explain the functions of each element in it.	6	L2	CO4
	c.	Calculate the quantity of materials required to constructs 1.2 km long BG track. Take sleeper density as m + 4, length of rail = 13 m.	8	L3	CO4

OR

8	a.	Explain the various track fittings and fasteners.	6	L2	CO4
	b.	Mention and list the various requirements of ideal permanent way.	6	L2	CO4
	c.	Explain the classification of railway station.	8	L2	CO4

Module – 5					
9	a.	List the various factors to be considered in the selection of site for an airport.	**6**	**L2**	**CO4**
	b.	Explain the various types of classification of airports.	**6**	**L2**	**CO4**
	c.	The length of runway under standard conditions is 1620 m. The airport site has an elevation of 270 m. Its reference temperature is 32-90°C. If the runway is to be constructed with an effective gradient of 0.20 percent, determine the corrected runway length.	**8**	**L3**	**CO4**
OR					
10	a.	Explain the type 1 wind rose diagram for orienting the runway.	**6**	**L2**	**CO4**
	b.	List and explain the various aircraft characteristics.	**6**	**L2**	**CO4**
	c.	Design an exit taxi way joining a runway and a parallel main taxiway. The total angle of turn is 30° and the turn off speed is 80 kmph. Take R_1 = 731 m for 80 kmph speed.	**8**	**L3**	**CO4**

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CBCS SCHEME - Make-Up Exam

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BCV405B

Fourth Semester B.E/B.Tech. Degree Examination, June/July 2025
Construction Equipment Plants and Machinery

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.	Explain in detail Basic components of Hydraulic system to enable the operation of various construction equipment.	10	L2	CO1
	b.	Explain different types of hydraulic machines in construction.	10	L2	CO1
		OR			
2	a.	Differentiate between standard equipment and special equipment.	10	L2	CO1
	b.	In detail explain two and four stroke engine components?	10	L2	CO1
		Module – 2			
3	a.	Explain different parts of Bulldozer and its classification.	10	L2	CO2
	b.	Explain the operation process of a Batching plant (concrete) ?	10	L2	CO2
		OR			
4	a.	What are the equipments used for earth work excavation explain in detail	10	L2	CO2
	b.	Illustrate the process of Asphalt Paver of Hot mix plant components.	10	L2	CO2
		Module – 3			
5	a.	What is Total Effective equipment performance? Explain why it is required?	10	L2	CO3
	b.	Define Maintenance, List and explain its types?	10	L2	CO3
		OR			
6	a.	Explain in detail factors affecting the selection of an new equipment of construction industry?	10	L2	CO3
	b.	Classify the phases of equipment cycle.	10	L2	CO3
		Module – 4			
7	a.	Write short notes on Hydraulic grabs, piling Rig.	8	L2	CO1
	b.	What is tunneling equipment? Explain the components and operation process of a Hard rock by TBM (Tunnel Boring Machine).	12	L2	CO1
		OR			
8	a.	Define Earth Pressure Balance (EPB). What are the challenges associated with the process of EPB.	10	L2	CO1
	b.	Describe the components and operational process of an Earth Pressure Balance.	10	L2	CO1
		Module – 5			
9	a.	Differentiate between mechanized and digitalization in the construction.	8	L2	CO1
	b.	What are different types of PPE required for construction works at site? Also explain safety measures?	12	L2	CO1
		OR			
10	a.	What are the potential hazards associated with 3D concrete printing?	8	L2	CO1
	b.	What is 3D concrete printing? How does 3D concrete printing work?	12	L2	CO1

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CBCS SCHEME - Make-Up Exam

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BCV502

Fifth Semester B.E/B.Tech. Degree Examination, June/July 2025
Geo-Technical 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: CO1urse outCO1mes.

		Module – 1	M	L	C
1	a.	With a neat sketch explain phase diagram.	6	L2	CO1
	b.	Prove that Gw = Se.	6	L3	CO1
	c.	Classify different types of soil structures.	8	L2	CO1
		OR			
2	a.	With a neat sketch explain consistency limits.	6	L2	CO1
	b.	A soil samples weighting 19 KN/m^3 has a water content of 30%. The specific gravity of soil particles is 2.68. Determine void ratio, porosity and degree of saturation.	6	L3	CO1
	c.	Explain soil classification by India standard.	8	L2	CO1
		Module – 2			
3	a.	State Darcy's law and list its assumptions.	6	L1	CO2
	b.	A soil profile of tree layers with the following properties is shown in the table below. Calculate the equivalent coefficients of permeability parallel and normal to the stratum.	6	L3	CO2
	c.	With a neat sketch explain effective stress concept and its impact in construction of structures.	8	L3	CO2
		OR			
4	a.	With a neat sketch list the characteristics of flow net.	6	L1	CO2
	b.	A permeameter of 82 mm diameter contains a soil simple of length 250 mm. In the constant head test, the loss of head was 1160 mm measured in time 10 sec. When the rate of flow was 2.73 ml, find the coefficient of permeability of soil.	6	L3	CO2
	c.	Explain the factors affecting on permeability.	8	L3	CO2

Layer	Thickness (m)	K(m/s)
1	3	2×10^{-6}
2	4	3×10^{-8}
3	3	3×10^{-5}

Module – 3

5	a.	Discuss the factors affecting compaction.	6	L2	CO3
	b.	The following data were obtained from standard proctor compaction test : Water content (%): 9, 11, 13, 15, 16, 17, 18 Bulk unit weight (KN/m^3): 18, 19, 19.9, 20.8, 21, 20.5, 20.1 Plot the compaction curve find out OMC and MDD.	6	L3	CO3
	c.	With a neat sketch explain mass-spring analogy.	8	L3	CO3
		OR			
6	a.	Explain how field compaction is controlled?	6	L2	CO
	b.	In a laboratory compaction test, 20 mm thick soil sample under double drainage condition took 30 minutes for 50% consolidation. Calculate the time required for 90% consolidation of the same clay in the filed, the thickness of soil strata is 2 m and drains on one face only. Take T_{50} = 0.196 and T_{90} = 0.848.	6	L3	CO3
	c.	With a neat sketch explain the Terzaghi's One dimensional consolidation Theory.	8	L3	CO3
		Module – 4			
7	a.	Explain Mohr-Coulomb failure criterion.	6	L2	CO4
	b.	A specimen of clean, dry, cohesionless sand is tested in shear box the soil failed at a shear stress of 40 KN/m^2 when normal stress on the specimen was 50 KN/m^2. Determine : i) The angle of shearing resistance ii) Principal stress during failure iii) Direction of principal planes with respect to the direction of plan of shearing.	8	L3	CO4
	c.	Explain the factors affecting shear strength of soils.	6	3	CO4
		OR			
8	a.	Elaborate on total and effective shear strength parameters.	6	L2	CO4
	b.	A soil has an unconfined compression strength of 120 KN/m^2. In a triaxial compression test, a specimen of the same soil when subjected to a chamber pressure of 40 KN/m^2 failed at an additional stress of 160 KN/m^2. Determine : i) Shear strength parameters of soil ii) Angle made by the failure plane in the triaxial test.	8	L3	CO4
	c.	Explain the procedure for conducting laboratory direct shear test.	6	L3	CO4

		Module – 5			
9	a.	With a neat sketch explain different types of foundations shear failures.	**8**	**L2**	**CO5**
	b.	A square footing of size 2.8 m × 2.8 m is built on a homogeneous bed of sand with unit weight of 18 KN/m^3 and $\phi = 36°$, if the depth of foundation is 1.8 m, determine the safe load that can be applied on the footing. Take F = 2.5, $N_c = 27$, $N_q = 36$ and $N_r = 35$.	**6**	**L3**	**CO5**
	c.	Differentiate between uniform differential settlement and also state its effect.	**6**	**L3**	**CO5**
		OR			
10	a.	Explain the effect of water table and load eccentricity on bearing capacity of soil.	**8**	**L2**	**CO5**
	b.	What will be the net ultimate bearing capacity of sand having $\phi = 36°$, $r_d = 19$ KN/m^3 for : i) 1.5 m strip foundation ii) 1.5 m square foundation The footings are placed at a depth of 1.5 m below ground level. Assume F : 2.5. Take $N_c = 65.4$, $N_q = 49.4$ and $N_r = 54$.	**6**	**L3**	**CO5**
	c.	Elaborate on immediate primary, consolidation and secondary consolidation settlement.	**6**	**L3**	**CO5**

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CBCS SCHEME - Make-Up Exam

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BCV601

Sixth Semester B.E/B.Tech. Degree Examination, June/July 2025
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. Assume suitable additional data, if necessary.
4. Use of IS456-2000, SP-16 is permitted.

		Module – 1	M	L	C
1	a.	Compare working Stress Method and Limit State Method.	10	L2	CO1
	b.	Explain : (i) Characteristic strength. (ii) Design strength (iii) Characteristic load (iv) Design load	10	L2	CO1
		OR			
2	a.	Explain the terms : Balanced, Under reinforced and over reinforced sections in Limit State method.	6	L2	CO1
	b.	A rectangular section beam 200 mm wide by 450 mm overall depth is reinforced with 3 bars of 16 mm diameter at an effective depth of 420 mm. Two hanger bars of 12 mm diameter are provided at the compression face. The effective span of the beam is 5 m. The beam supports a service live load of 10 kN/m. If $f_{CK} = 20$ N/mm^2 and $f_Y = 415$ N/mm^2. Compute (i) Short Term Deflection (ii) Long Term Deflections according to IS code specifications.	14	L3	CO1
		Module – 2			
3	a.	Prove $x_u = 0.48\,d$ from properties of Balanced section of steel grade – Fe-415.	5	L5	CO2

	b.	A Rectangular beam of size 200 mm width, 450 mm effective depth is reinforced with 3 Nos of 16 mm diameter bars. Interpret the following cases : Case (i) : Safe moment of Resistance of the section Case (ii) : Safe moment of Resistance of the section, if steel increases to 3 Nos of 20 mm diameter bars. Case (iii) : Strain in steel for both cases (i) and (ii). Use M-20 grade of concrete and Fe-415 grade of steel.	15	L5	CO2
		OR			
4	a.	What are the situations where doubly reinforced beams are used in structural design?	4	L1	CO2
	b.	Determine the ultimate Flexural strength of T-beam for the following section properties : Width of flange = 800 mm Width of Rib = 300 mm Depth of Flange = 150 mm Effective depth = 420 mm Area of steel = 1470 mm^2 M-25 grade of concrete and Fe-415 grade of steel.	16	L5	CO2
		Module – 3			
5		Design a singly reinforced beam of clear span 5 m to support a working live load 12 kN/m. Adopt M-20 grade of concrete and Fe-415 grade of HYSD bars. Sketch the reinforcement details.	20	L5	CO3
		OR			
6		Design a Doubly reinforced concrete beam of rectangular section using the following data : Effective span = 8 m Working live load = 30 kN/m Overall depth restricted to 650 mm Width of beam = 300 mm M-20 grade of concrete and Fe-415 grade of steel. Sketch the reinforcement details.	20	L5	CO3

Module – 4					
7		Design a RCC slab for a room size $4m \times 5m$. The slab is supported all around on wall of width 300 mm. The slab has to carry a live load of 4 kN/m^2 and floor finish 1 KN/m^2. Use M-20 grade of concrete and Fe-415 grade of steel. Assume corners are held down. Sketch the reinforcement details.	20	L5	CO4
OR					
8		Design one of the flights of stairs of a school building spanning between landing beams to suit the following data : Type of stair case-Dog-legged Number of steps in flight = 12 Tread = T = 300 mm Riser = R = 160 mm Width of landing beams = 400 mm Materials M20 grade of concrete and Fe-415 grade of steel. Also show the reinforcement details.	20	L5	CO4
Module – 5					
9		A short column located at the corner of a building is subjected to an factored axial load of 2000 KN together with factored moments of 75 kN-m and 60 kN-m acting in perpendicular planes. The size of column is fixed as 450 mm×450 mm. Adopting M-20 grade of concrete and Fe-415 grade of steel. Design suitable reinforcements in column section.	20	L3	CO5
OR					
10		A RCC column of size $400\,mm \times 400\,mm$ supports an axial service load of 1000 kN. The safe bearing capacity of soil at site is 200 kN/m^2. Adopting M-20 grade of concrete and Fe-415 grade of steel. Design suitable footing for the column and sketch the details of reinforcements.	20	L3	CO5

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CBCS SCHEME - Make-Up Exam

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BCV602

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
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.	Define the term irrigation and what are the types of flow irrigation? Explain any two flow irrigation system.	6	L2	CO1
	b.	Define duty, delta and Base period. Derive an expression to establish relation between them.	6	L2	CO1
	c.	After how many days will you supply water to soil in order to ensure sufficient irrigation of the given crop if i) Field capacity of soil = 28% ii) Permanent wilting point = 13% iii) Effective depth of root zone = 70 cm iv) Dry density of soil = 1.3 gm/cc v) Daily consumptive use of water of given crop = 12 mm	8	L3	CO1
		OR			
Q.2	a.	List the benefits and ill effects of irrigation.	6	L1	CO1
	b.	List and explain Irrigation efficiencies.	6	L2	CO1
	c.	An irrigation canal has gross command area of 80000 hectors out of which 85% is culturable. The intensity of irrigation for Kharif season is 30% and for Rabi season 60%. Find the discharge required at the head of the canal if the duty at its head is 800 ho/cu for Kharif season and 1700 ho/cu for rabi season.	8	L3	CO1
		Module – 2			
Q.3	a.	Explain various considerations for canal alignment.	8	L2	CO1
	b.	Design an irrigation channel to carry a discharge of 45 cumecs. Assume N = 0.0225 and M = 1. The channel has a bed slope of 0.16 meter per kilometer. Use Kennedys theory and trial depth D as 1.8 m.	12	L3	CO1
		OR			
Q.4	a.	Explain with neat sketch the storage zones of a reservoir.	8	L2	CO1
	b.	The monthly yield of water from a catchment is given below. Determine the minimum capacity of the reservoir by mass curve method if the flow is drawn at a uniform rate. Values are given in million cubic meters	12	L3	CO1

Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Inflow volume	1.4	2.1	2.8	8.4	11.9	11.9	7.7	2.8	2.25	2.24	1.96	1.68

		Module – 3			
Q.5	**a.**	Discuss briefly forces acting on gravity dam with the help of a neat sketch.	**10**	**L2**	**CO1**
	b.	Design the practical profile of a gravity dam made of stone masonry given the following data: RL of base of dam = 198 m RL of HFL of reservoir = 228 m Specific gravity of masonry = 2.4 Safe compressive stress in = 1200 kN/m^2 masonry	**10**	**L3**	**CO1**
		OR			
Q.6	**a.**	Discuss in brief various modes of failure of gravity dam.	**6**	**L2**	**CO1**
	b.	Explain step by step graphical procedure to be adopted for analyzing the stability of gravity dam.	**8**	**L2**	**CO1**
	c.	Design and draw the practical profile of a gravity dam to a suitable scale, when height of water to be stored = 55 m, specific gravity of concrete = 2.4, free board = 2.75 m	**6**	**L3**	**CO1**
		Module – 4			
Q.7	**a.**	Explain with neat sketches different types of earth dams.	**10**	**L2**	**CO2**
	b.	Explain the causes of failure of earth dam.	**10**	**L2**	**CO2**
		OR			
Q.8	**a.**	Define a spillway. Write neat sketches of different types of spillways.	**10**	**L2**	**CO2**
	b.	Describe the design principles that are involved in the design of ogee spillway.	**10**	**L2**	**CO2**
		Module – 5			
Q.9	**a.**	Draw a neat sketch of diversion head works and indicate various components of the system. Briefly indicate the function of each component.	**10**	**L2**	**CO3**
	b.	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**	**L2**	**CO3**
		OR			
Q.10	**a.**	Define a Weir and Barrage with the help of a neat sketch.	**6**	**L2**	**CO3**
	b.	Explain Bligh's creep theory for the design of impervious floor weir.	**6**	**L2**	**CO3**
	c.	Briefly explain silt ejectors and silt excluders.	**8**	**L2**	**CO3**

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CBCS SCHEME - Make-Up Exam

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BCV613C

Sixth Semester B.E/B.Tech. Degree Examination, June/July 2025
Applied 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.	What are the objectives of soil exploration?	6	L2	CO1
	b.	Explain Wash Boring method with the help of a neat sketch.	8	L2	CO1
	c.	Determine the area ratio for the following soil sampler and cemment on nature of samples obtained in each samplers. i) Core cutter 185 mm OD, 135 mm ID ii) Split barrel 51 mm OD, 45 mm ID iii) Shell by tube 51 mm OD, 49 mm ID	6	L3	CO1
		OR			
2	a.	Distinguish between disturbed, undisturbed and representative soil samples.	6	L2	CO1
	b.	What is sterilization of boreholes? Mention various methods of sterilization of bore hole and explain any one method.	8	L2	CO1
	c.	What is Bore hole log? What are the details you can get from Bore hole log?	6	L2	CO1
		Module – 2			
3	a.	Explain : i) Electro-Osmosis method of dewatering ii) Vacuum method of dewatering with a neat sketch.	12	L2	CO2
	b.	Estimate the position of the ground water table from the following data obtained from the field: Depth upto which water is boiled out = 30 m, Raise in water level on first day = 2.2 m. Raise in water level on second day = 1.8 m. Rise in water level on third day = 1.5 m.	8	L3	CO2
		OR			
4	a.	What is Phreatic line? Describe Casagrande's method to locate the phreatic line in a homogeneous earth dam with a horizontal filter at its toe.	8	L2	CO2
	b.	Compute the quantity of water seeping under a weir per day for which the slope has been constructed. The coefficient of permittivity is 2×10^{-2} mm/s, $N_f = 5$ and $N_d = 18$. The difference in water level between upstream and downstream is 3 m. The length of weir is 60 m.	6	L3	CO2
	c.	Explain the properties of flow net.	6	L2	CO2

Module – 3

5	a.	Explain Active and Passive earth pressure with a neat sketch.	6	L2	CO3
	b.	For the retaining wall shown in fig.Q. 5 (b) assume that wall can yield sufficiently to develop active state. Determine active force per metre of the wall and location of the resultant line of action by Rankine's theory.	14	L3	CO3

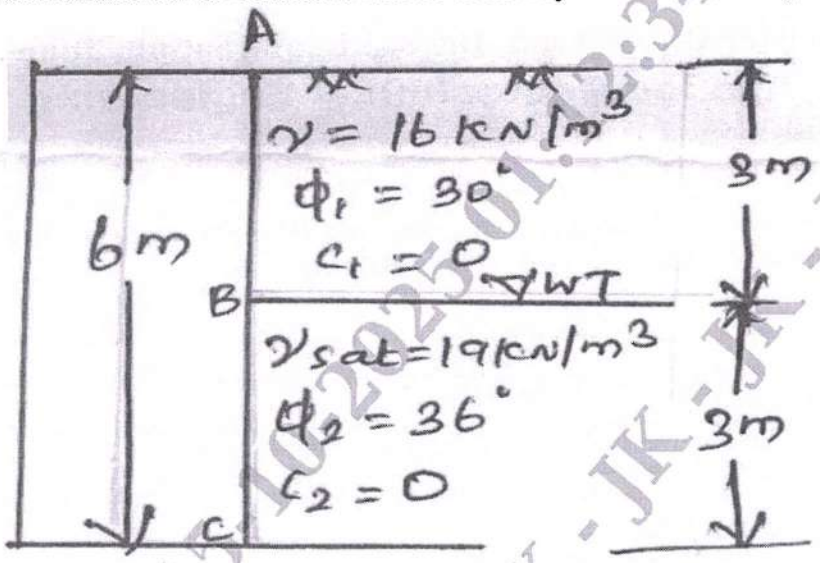

Fig. Q.5(b)

OR

6	a.	List the factors influencing lateral earth pressure.	6	L2	CO3
	b.	A trapezoidal masonry retaining wall 1 m wide at its top and 3 m wide at bottom is 4 m height. The vertical face is retaining soil at an angle of internal friction of 30° and at a surcharge angle of 20° with horizontal. Determine maximum and minimum intensities of pressure at the base of retaining wall. Unit weight of soil and masonry are 20 KN/m^3 and 24 KN/m^3 respectively. Assuming coefficient of friction at Base of wall as 0.45. Determine factor of safety against sliding and overturning [For $\beta = 20°$ and $\phi = 30°$ take $K_a = 0.414$]	14	L3	CO3

Module – 4

7	a.	List the assumptions made in slope stability analysis.	6	L1	CO4
	b.	Explain Fellenius method of obtaining critical slip surface in the case of stability analysis of c-d soil.	8	L2	CO4
	c.	An embankment 8 m high has a slope of IV:2H. Determine FOS along a trial slip circle through the toe, having a central angle of 102° with a radius of 16 m. The soil properties are C = 33 KN/m^2 and $\phi = 12°$. Analysis by method of slices gave the following results. $\Sigma N = 1200$ KN, $\Sigma T = 350$ KN.	6	L3	CO4

OR

8	a.	Explain types of slope failures with neat sketches.	6	L2	CO4
	b.	Explain stability analysis of finite slope by method of slices.	8	L2	CO4
	c.	A 5 m deep cut made in a soil has C = 15 KN/m^2 and $\phi = 10°$, slope angle is 1:1, unit weight of soil is 18 KN/m^3. Calculate the FOS. What will be the change in FOS if the slope angle changed to IV:1½H. For $\phi = 10°$, the stability number is given as follows:	6	L3	CO4

Slope angle	45°	30°	15°
S_n	0.108	0.075	0.023

Module – 5

9	a.	A line load of 100 KN/m run extends to a long distance. Determine the intensity of vertical stress at a point 2 m below the surface i) directly under the load ii) at a distance of 2 m perpendicular to the line.	6	L3	CO5
	b.	Explain types of settlement with formula.	8	L2	CO5
	c.	Write short notes on contact pressure.	6	L2	CO5
OR					
10	a.	A water tank is supported by a ring foundation having outer diameter of 10 m and inner diameter of 7.5 m. The ring foundation transmits uniform load intensity of 160 KN/m^2. Compute vertical stress at a depth of 4 m below the centre of ring foundation.	6	L3	CO5
	b.	Explain the construction and uses of Newmark's chart.	8	L2	CO5
	c.	A layer of clay 8 m thick underlies a proposed new building. The existing overburden pressure at the centre of layer is 300 KN/m^2 and the load due to construction of new building increases by 150 KN/m^2, w_h = 65%, w = 50%, G = 2.65. Estimate consolidation settlement.	6	L3	CO5

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CBCS SCHEME - Make-Up Exam

USN | | | | | | | | | | |

BCV654B

Sixth Semester B.E./B.Tech. Degree Examination, June/July 2025
Geographic Information System

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.	Explain the basic spatial concepts used in GIS. Discuss the importance of spatial data and coordinate system in geographic information systems.	10	L2	CO1
	b.	What are the main components of a GIS? Explain role of each components with example.	10	L1	CO1
		OR			
Q.2	a.	Compare proprietary and open source GIS software.	10	L3	CO1
	b.	Differentiate between spatial and attribute data in GIS. Explain the type of attributes and various level of measurement used for attribute data in GIS.	10	L2	CO1
		Module – 2			
Q.3	a.	Explain the different types of spatial data model used in GIS. Difference between raster and vector data.	10	L3	CO2
	b.	Discuss the characteristics advantages and limitation of raster and vector data model.	10	L3	CO2
		OR			
Q.4	a.	Describe the structure and use of relational and object-oriented databases is GIS. Explain how entities and ER diagram are used in designing GIS databases.	10	L3	CO2
	b.	Explain Raster data structures and Raster data compression techniques. Why is data compression important in Raster GIS.	10	L3	CO2
		Module – 3			
Q.5	a.	Discuss the role of scanners, digitizers, and GPS device in the data acquisition process.	10	L2	CO3
	b.	What is geo-referencing? Describe the process of projection re-projection and coordinate transformation is GIS with suitable example.	10	L2	CO3
		OR			
Q.6	a.	Define topology in GIS. Explain the concepts of adjacency, connectivity and containment and importance of topological consistency in spatial analysis.	10	L2	CO3
	b.	How is attribute data linked to spatial data is GIS? Discuss methods of linking external data base to GIS and the integration of GPS data in spatial analysis.	10	L3	CO3

		Module – 4			
Q.7	**a.**	Explain the basic aspects of data qualify in GIS. Discuss completeness, logical consistency, positional accuracy and temporal accuracy.	**10**	**L2**	**CO4**
	b.	What is metadata in GIS? Describe its components and significance ensuring data quality and usability in GIS projects.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	What is interoperability in GIS? Describe the role of Open Geospatial Consortium (OGC) standards in promoting interoperability among GIS systems and data source.	**10**	**L3**	**CO4**
	b.	Describe the concept of Spatial Data Infrastructure (SDI). Explain its components.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain the various data management functions in GIS. Discuss how data is imported, exported stored and organized for efficiency GIS analysis.	**10**	**L2**	**CO5**
	b.	Describe the process and significance of raster to vector and vector to raster conversion.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Discuss the different types of data output in GIS and explain the process of map complication. Use of charts, graphs, and multimedia for effective presentation.	**10**	**L2**	**CO5**
	b.	Differentiate between enterprise GIS and desktop GIS and highlight their features, advantages and suitable application.	**10**	**L2**	**CO5**

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