

CBCGS SCHEME

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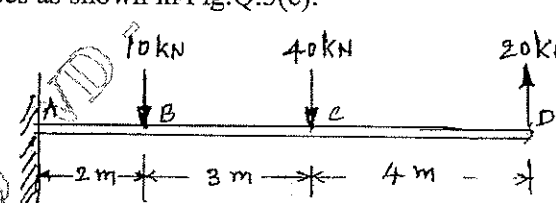
BCV301

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

Module - 1		M	L	C
Q.1	a. Draw Stress-Strain diagram for structural steel subjected to axial tensile force and explain the salient points.	06	L2	CO1
	b. Define the following: i) Poisson's Ratio ii) Modulus of Rigidity iii) Modulus of Elasticity iv) Bulk Modulus	04	L1	CO1
	c. Calculate the modulus of rigidity and bulk modulus of a cylindrical bar of diameter 25 mm and of length 1.2 m, if the longitudinal strain in the bar during a tensile test is four times the lateral strain. Also find the change in volume when the bar is subjected to a hydrostatic pressure of 120 N/mm ² . Take $E = 1.2 \times 10^5$ N/mm ² .	10	L3	CO1
OR				
Q.2	a. State and explain Hook's Law.	04	L2	CO1
	b. Derive an expression for relation between modulus of elasticity and modulus of rigidity.	06	L3	CO1
	c. A weight of 390 kN is supported by a short column of 250 mm square in section. The column is reinforced with 8 steel bars of cross-sectional area 2500 mm ² . Find the stresses in steel and concrete if $E_{st} = 15 E_{con}$. If stress in concrete must not exceed 4.5 N/mm ² , what area of steel is required in order that column may support a load of 480 kN?	10	L3	CO1
Module - 2				
Q.3	a. Define Shear Force and Bending Moment at a section and state relation between them.	04	L1	CO2
	b. Draw SFD and BMD for a cantilever subjected UDL of W N/m over entire length. Length of cantilever is L m.	06	L3	CO2
	c. Draw the shear force and bending moment diagrams for a cantilever subjected forces as shown in Fig.Q.3(c).	10	L3	CO2
 <p style="text-align: center;">Fig.Q.3(c)</p>				
1 of 3				

OR

Q.4	a.	Define Point of Contraflexure and explain how to calculate point of contraflexure.	04	L1	CO2
	b.	Derive the relation between rate of loading, shear force and bending moment.	06	L3	CO2
	c.	Draw SFD and BMD for the beam loaded as shown in Fig.Q4(c). Also locate the point of contraflexure.	10	L3	CO2

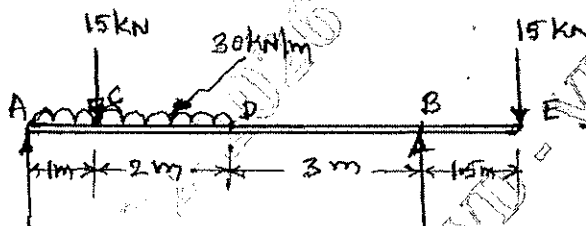


Fig.Q4(c)

Module – 3

Q.5	a.	With usual notations, derive Bernoulli – Euler bending equation. Also mention the assumptions made in derivation of bending equation.	08	L3	CO3
	b.	A simply supported beam with 'T' section is subjected to the force as shown in Fig.Q5(b). Determine the shear stress distribution along depth of the section of beam subjected to maximum shear force.	12	L4	CO3

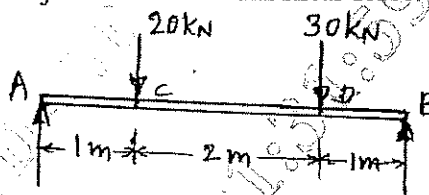


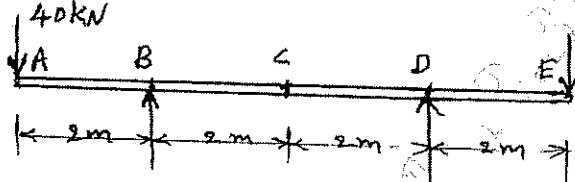
Fig.Q5(b)

OR

Q.6	a.	List the assumption made in the theory of torsion. Also derive the torsion equation $\frac{T}{J} = \frac{G\theta}{L} = \frac{\tau}{R}$	10	L3	CO3
	b.	A solid shaft is of 50 mm diameter. Determine the diameters of a hollow shaft such that its area of cross-section is same as that of solid shaft. the inner diameter of hollow shaft is 0.8 times outer diameter. Compare the torsional strengths and torsional stiffness of the hollow and solid shafts, the length, material being same in both cases.	10	L4	CO3

Module – 4

Q.7	a.	Derive deflection equation $EI \frac{d^2y}{dx^2} = M$	06	L3	CO4
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Q.7	b.	Calculate slope at 'B' and deflection at 'C' for the overhanging beam shown in Fig.Q7(b). Take $E = 200 \text{ GPa}$ and $I = 50 \times 10^6 \text{ mm}^4$.	14	L4	CO4
 <p style="text-align: center;">Fig.Q7(b)</p>					
OR					
Q.8	a.	Differentiate between Short and Long column and what are the limitations of Euler's theory.	06	L3	CO4
	b.	A 2 meters long column has a square cross-section of side 40mm. Taking the factor of safety as 4, determine the safe load for the end conditions, (i) both ends are hinged (ii) one end is fixed and other end is free (iii) Both ends are fixed (iv) One end is fixed and other end is hinged. Take $E = 210 \text{ GPa}$.	14	L4	CO4
Module - 5					
Q.9	a.	Define Principal Stresses and Principal Planes.	04	L1	CO5
	b.	Derive expression for normal stress and tangential stress for a member subjected to uniaxial loading.	06	L3	CO5
	c.	A point in a strained member is subjected to biaxial stresses 85 MPa (tensile) and 60 MPa (comp). The point is also subjected to a shear stress 45 MPa such that shear force on vertical faces gives rise to clockwise couple. Determine : i) Stress acting on a plane whose normal is at an angle of 40° with reference to 85 MPa stress direction. ii) Magnitudes of Principal stresses and maximum and minimum shear stresses iii) Orientation of the Principal planes and maximum and minimum shear stress planes.	10	L4	CO5
OR					
Q.10	a.	List the differences between thick and thin cylinders.	04	L1	CO5
	b.	Derive Lamé's equation for the radial and hoop stress for thick cylinder subjected to internal and external fluid pressure.	08	L3	CO5
	c.	A cylindrical pressure vessel with inner and outer diameters 180 mm and 220 mm respectively is subjected to an internal pressure 10 MPa. Taking the circumferential stress at the inner wall as 25 MPa (tension). Determine (i) maximum value of external pressure that can be applied (ii) circumferential stress on the outer surface.	08	L4	CO5

OR

Q.6	a.	Discuss on profile and cross-sectioning with typical sketches.	8	L2	CO3
	b.	Define the following with typical sketches: contour, internal, horizontal equivalent and ridge line.	6	L1	CO3
	c.	Explain : i) Importance of back sight data ii) Tools to plot in CAD in total station.	6	L1	CO3

Module - 4

Q.7	a.	A road embankment is 8 m wide and 200 m in length, at the formation level, with a side slope of 1.5:1. The embankment has a rising gradient of 1 in 100 m. The ground levels at every 50 m along the centre line are as follows: <table border="1" data-bbox="448 734 1082 813"> <tr> <td>Distance (m)</td> <td>0</td> <td>50</td> <td>100</td> <td>150</td> <td>200</td> </tr> <tr> <td>RL (m)</td> <td>164.5</td> <td>165.2</td> <td>166.8</td> <td>167</td> <td>167.2</td> </tr> </table> <p>The formation level of zero chainage is 166.0 m. Calculate the volume of earthwork by trapezoidal and prismoidal rule.</p>	Distance (m)	0	50	100	150	200	RL (m)	164.5	165.2	166.8	167	167.2	10	L3	CO4
Distance (m)	0	50	100	150	200												
RL (m)	164.5	165.2	166.8	167	167.2												
	b.	Define: point of curve, midordinate and tangent length with a neat sketch.	6	L1	CO4												
	c.	List the different types of vertical curves.	4	L1	CO4												

OR

Q.8	a.	Two tangents intersect at a chainage of 1192.00 m, the deflection angle being $50^{\circ}00'$. Calculate the necessary data for setting out a curve of 300 m radius to connect the two tangents if it is intended to set out by Rankine's method. Take peg interval as 30 m.	10	L3	CO4
	b.	With the neat sketch, show the different parts of compound curve.	6	L1	CO4
	c.	How total station is useful in setting out work?	4	L1	CO4

Module - 5

Q.9	a.	Discuss the different types of GPS receivers and their applications.	8	L2	CO5
	b.	Explain how remote sensing is applied in civil and environmental engineering.	6	L2	CO5
	c.	What are different types of sensors used in drone surveying?	6	L1	CO5

OR

Q.10	a.	List and explain the main requirements for drone surveying.	8	L1	CO5
	b.	Describe the main components of GPS system.	6	L2	CO5
	c.	Different between two positioning methods in GPS.	6	L1	CO5

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BCV303

Third Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Engineering Geology

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.	Based on Seismological evidence explain the internal structure of Earth with appropriate sketch. Also explain its composition, temperature and distance.	10	L2	CO1
	b.	Explain causes of Landslides. Also explain the prevention and control of landslide.	10	L3	CO1
OR					
Q.2	a.	Explain causes of Earthquakes with Stress Vs Strain Curve.	10	L3	CO1
	b.	Explain Cyclones, causes and remedial measures for Cyclone management.	10	L3	CO1
Module – 2					
Q.3	a.	With appropriate mineral example explain any two physical properties. i) Habit ii) Hardness iii) Diaphaneity.	8	L2	CO2
	b.	With appropriate sketch explain texture of Igneous Rocks.	8	L3	CO2
	c.	Define Mineral and Ore mineral with suitable example.	4	L1	CO2
OR					
Q.4	a.	Explain the occurrence of Igneous Rocks.	6	L2	CO2
	b.	With neat sketch explain structure of sedimentary rocks.	8	L2	CO2
	c.	Write a note on formation of metamorphic rocks.	6	L2	CO2
Module – 3					
Q.5	a.	Explain processes of weathering and also explain physical weathering of a rock.	8	L2	CO3
	b.	Define soil. With neat sketch explain soil profile and list the varieties of soil.	8	L3	CO3
	c.	Briefly write a note on soil types.	4	L2	CO3

OR

Q.6	a.	Explain process of weathering and also explain chemical weathering of a rock.	8	L2	CO3
	b.	Differentiate Black Cotton Soil and Laterite Soil.	8	L3	CO3
	c.	Define Soil Mineralogy and Soil Structure.	4	L2	CO3

Module – 4

Q.7	a.	A sand stone formation dip 45° along S 50° E and 35° along S 40° W. Find the amount of true Dip.	8	L3	CO4
	b.	A bed of Chromite at Byrapur, Hassan district has a dip of 25° East, out crop is 160 M wide measured on level ground. Find true and vertical thickness (Graphical method) Scale : 1 cms = 40 mts.	6	L3	CO4
	c.	With sketch explain Anticline and Syncline fold.	6	L2	CO4

OR

Q.8	a.	With sketch explain Normal Fault and Reverse fault.	6	L2	CO4
	b.	A bed of sandstone have a dip of 40° and 20° slope (both west ward), the width of out crop is 200 m. Find true and vertical thickness. Scale : 1 cms = 50 Mts. (Graphical Method)	6	L3	CO4
	c.	P, Q and S are 3 boreholes sunk at the centers of square grid with sides measuring 60 mts, where 'P' is North of 'S' and 'Q' is East of 'P' the depth of shale bed is 3 mts at P, 13 mts at 'Q' and 18 m at 'S'. Determine another bore hole at vacant corner of square grid. Find the depth of shale bed 'R'. Horizontal scale 1 cms = 10 m Gradient scale 0.5 cms = 1 unit.	8	L4	CO4

Module – 5

Q.9	a.	Explain Electrical Resistivity method by Schlumberger method and also write types of curves based on Schlumberger method.	10	L3	CO5
	b.	What is Permeability of Rock? Also explain factors influencing permeability.	10	L2	CO5

OR

Q.10	a.	With neat sketch explain confined and unconfined aquifer and differentiate Aquifer and Aquifuge.	10	L3	CO5
	b.	Write a note on water bearing Properties of Igneous, Sedimentary and Metamorphic rocks.	10	L2	CO5

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BCV304

Third Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 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									
Q.1	a.	Explain the diverse categories of water demand for community.	9	L2	CO1										
	b.	List out the factors affecting per capita demand.	7	L1	CO1										
	c.	Determine the five demands for a city with a population of 35000 using freeman's formula.	4	L2	CO1										
OR															
Q.2	a.	What is Design Period? What are the factors governing it?	6	L2	CO1										
	b.	Enumerate and explain the characteristics of surface and ground water. State their environmental significance.	8	L2	CO1										
	c.	Determine the future population of a satellite town by geometric increase method for the year 2030, 2040, 2050 with available census data : <table border="1" style="margin-left: auto; margin-right: auto; border-collapse: collapse;"> <tr> <td style="text-align: center;">Year</td> <td style="text-align: center;">1990</td> <td style="text-align: center;">2000</td> <td style="text-align: center;">2010</td> <td style="text-align: center;">2020</td> </tr> <tr> <td style="text-align: center;">Population</td> <td style="text-align: center;">93,000</td> <td style="text-align: center;">1,11,000</td> <td style="text-align: center;">1,32,000</td> <td style="text-align: center;">1,61,000</td> </tr> </table>	Year	1990	2000	2010	2020	Population	93,000	1,11,000	1,32,000	1,61,000	6	L3	CO1
Year	1990	2000	2010	2020											
Population	93,000	1,11,000	1,32,000	1,61,000											
Module – 2															
Q.3	a.	Explain with a neat sketch working and back working of rapid sand filter?	10	L2	CO2										
	b.	Compute the dimension of continuous flow rectangular sedimentation tank for a population of 20,000 persons with a daily per capita demand 120 ltr. Assume detention period to be 6 hours.	10	L3	CO2										
OR															
Q.4	a.	With the help of neat sketch prepare water treatment plant.	8	L2	CO2										
	b.	Differentiate between alum and Iron salts for use as a coagulant.	6	L2	CO2										
	c.	Determine the quantity of copperas and the lime required per year to treat 4×10^6 lt/day. If 11-mg of copper as consumed with lime at a coagulation basin. Molecular weight Fe 55.85, S = 32, O = 16, H = 1, Ca = 40.	6	L3	CO2										
Module – 3															
Q.5	a.	List out the requirement of good disinfectant.	6	L1	CO3										
	b.	Explain the zeolite process for the removal of permanent hardness from water?	8	L2	CO3										
	c.	The water works of a town of population 25000 has to meet its water demand at the rate of 135 Lpcd. If the disinfection is to be done by the bleaching powder having 45% available chlorine determine the quantity of the bleaching powder required per year. The required dose of chlorine at the water works is 0.3 ppm for disinfection.	6	L3	CO3										

OR					
Q.6	a.	Explain the types of sewerage system.	9	L2	CO4
	b.	List out the factors influencing the dry weather flow and explain.	6	L2	CO4
	c.	A city with a population of 1,00,000 has an area of 50 Km ² . Rate of water supply is 110 Lpcd of which 80% turns into sewer. The average runoff coefficient is 0.5 and intensity of rainfall is 14.5 mm/hr. Estimate the quantity of combined sewage. Take peak factor as 2.5.	5	L3	CO3
Module – 4					
Q.7	a.	Examine the components and operational principles of an activated sludge process with neat sketch. Write its advantages and disadvantages.	10	L2	CO4
	b.	Design a rectangular sedimentation tank for treating 12 MLD of sewage adopting L : B ratio as 2.5 and overflow rate 40 m ³ /m ² /day. Assume detention time as 2 hrs.	10	L3	CO4
OR					
Q.8	a.	With the help of neat sketch prepare waste water treatment plant for a large community.	8	L2	CO4
	b.	Explain the importance of screens and types of screens in sewage treatment.	6	L2	CO4
	c.	Distinguish between grit chambers with plain sedimentation tank.	6	L2	CO4
Module – 5					
Q.9	a.	List out the operational problem of standard rate trickling filters and their remedies.	10	L2	CO5
	b.	Explain with neat sketch, construction and working of a rotating Biological contractor.	10	L2	CO5
OR					
Q.10	a.	Explain with a neat sketch, the details of oxidation pond.	8	L2	CO5
	b.	What is sludge digestion? What are the two basic types of sludge digestion units?	6	L2	CO5
	c.	Write a note on Sludge drying beds.	6	L2	CO5

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BCV306D

Third Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026 Fire Safety in Building

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 briefly basic concept of fire protection and characteristic of fire?	10	L2	CO1
	b.	Illustrate planning for fire protection and list out classes of fire?	10	L2	CO1
OR					
Q.2	a.	Explain fire prevention and fire safety precaution in detail.	10	L2	CO1
	b.	Explain the process of ventilation and fuel controlled fire with the model graph?	10	L2	CO1
Module – 2					
Q.3	a.	Explain briefly fire safety for urban planning?	10	L2	CO2
	b.	Explain the process of fire escape and fire refuge?	10	L2	CO2
OR					
Q.4	a.	Explain different type of fire detectors any three in detail?	10	L2	CO2
	b.	List out the difference between lift and escalators used for fire safety?	10	L2	CO2
Module – 3					
Q.5	a.	Explain the process of flow system with neat sketch?	10	L2	CO3
	b.	Explain water supply requirements for firefighting and list out briefly any two fixed water system.	10	L2	CO3
OR					
Q.6	a.	Explain the design components of water supply distribution system?	10	L2	CO3
	b.	Explain flow in pipe network and classify the types of pipe networks in brief.	10	L2	CO3
Module – 4					
Q.7	a.	Explain the concept of HVAC along with governing equation.	10	L2	CO4
	b.	Illustrate the characteristic of intelligent building.	10	L2	CO4
OR					
Q.8	a.	Explain the design of Electrical System for residential building.	10	L2	CO4
	b.	Illustrate the planned and Ad-hoc maintenance of building.	10	L2	CO4
Module – 5					
Q.9	a.	Explain briefly the process and steps involved in conditioning survey.	10	L2	CO5
	b.	Explain the process of diagnosis of building by visual survey.	10	L2	CO5
OR					
Q.10	a.	Explain any one Non Destructive test of building inspection in detail with neat sketch.	10	L2	CO5
	b.	Explain the effect of corrosion and Alkali Aggregate Reaction of building materials.	10	L2	CO5
