CBCS Scheme

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

15CV/CT32

Third Semester B.E. Degree Examination, June/July 2018
Strength of Materials

Time: 3 hrs. Max. Marks: 80

Note: *1.* **Answer any FIVE full questions, choosing ONE full question from each module.**
2. Missing data, if any, may be suitably assumed.

Module-1

1 a. For a bar of uniform section derive an expression for elongation due to self weight. **(06 Marks)**

b. Evaluate the deformation of the bar, given, $E_1 = E_2 = E_3 = 200GPa$, refer Fig.Q1(b). **(10 Marks)**

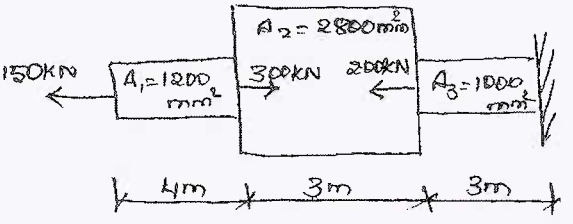

Fig.Q1(b)

OR

2 a. Derive an expression between Young's modulus, Modulus of rigidity and Poisson's ratio. **(10 Marks)**

b. A circular rod of dia 200mm and 500mm long is subjected to a tensile force of 45kN modulus of elasticity = 200 kN/mm^2, Find stress, strain and elongation of bar due to applied load. **(06 Marks)**

Module-2

3 At a certain point in a stressed body, the principal stresses are σ_x = 80 MPa and σ_y = –40MPa. Determine σ and τ on the planes whose normal's are at +30° and +120° with x – axis. **(16 Marks)**

OR

4 a. Derive an expression of tangential stress and longitudinal stress of thin walled pressure vessels. **(08 Marks)**

b. A rectangular block of material is subjected to a tensile stress of 100N/mm^2 on one plane and a tensile stress of 50N/mm^2 on a plane at right angles together with shear stress of 60 N/mm^2 on same planes, find : i) direction of the principal plane ii) magnitude of the principal plane iii) magnitude of greatest shear stress. **(08 Marks)**

Module-3

5 a. Define : i) bending moment ii) shear force iii) shear force diagram iv) bending moment diagram. **(08 Marks)**

b. Draw SFD and BMD for the cantilever beam shown in Fig.Q5(b). **(08 Marks)**

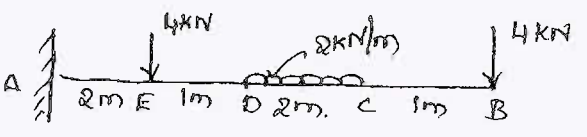

Fig.Q5(b)

OR

6 a. Derive the relation between load intensity, bending moment and shear force. **(06 Marks)**

b. A beam ABC, 8m long has supplied at A and B, it is long between A and B. The beam carries an udl of 10kN/m between A and B. At free end point C, a point load of 15 kN acts. Draw BMD and locate point of contra-flexure, if any. **(10 Marks)**

Module-4

7 a. Explain pure bending with an suitable example and mention the assumptions of pure bending. **(06 Marks)**

b. A cast iron beam section shown in Fig.Q7(b) is freely supported on a span of 5m. IF the tensile stress is not to exceed 20 N/mm^2. Find the safe UDL which the beam can carry. Find also the maximum compressive stress. **(10 Marks)**

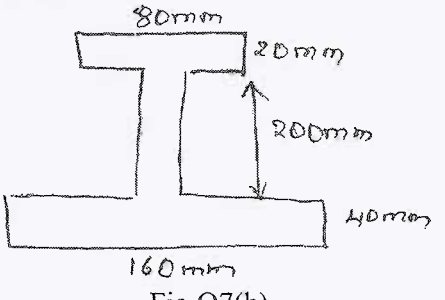

Fig.Q7(b)

OR

8 a. Derive an Euler's crippling load when both ends of the column are pinned. **(08 Marks)**

b. A hollow cylindrical cost iron column is 4m long both ends being, fixed. Design the column to carry a axial load of 250 kN. Use Rankine's formula and factor of safety = 5. The internal diameter may be taken as 0.80 time the external diameter. Take E_C = 550 N/mm^2 and $\alpha = \frac{1}{1600}$. **(08 Marks)**

Module-5

9 a. Derive torsional equation for circular shaft. **(08 Marks)**

b. A steel shaft transmits 105kN at 160 rpm. If the shaft is 100mm in diameter. Find the torque on the shaft and the maximum sharing stress induced. **(08 Marks)**

OR

10 a. Define pure torsion, polar modulus and torsional rigidity. **(06 Marks)**

b. A solid shaft is subjected to a torque of 15 kN-m. Find the necessary diameter of the shaft if the allowable shearing stress is 60N/mm^2 and the allowable twist is 1 degree in a length of 20 diameters of the shaft. Take C = 8×10^4 N/mm^2. **(10 Marks)**

* * * * *

CBCS Scheme

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

15CV33

Third Semester B.E. Degree Examination, June/July 2018
Fluid Mechanics

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. Assume missing data if any suitably.

Module-1

1 a. Distinguish between
i) Ideal fluid and real fluid
ii) Newtonion and non Newtonion fluid
iii) Cohesion and adhesion **(06 Marks)**

b. State and prove Pascal's law. **(04 Marks)**

c. Calculate the specific weight, density, specific volume and specific gravity of two litres of a liquid which weighs 15 N. **(06 Marks)**

OR

2 a. With the help of neat sketches, explain (i) simple U-tube manometer and (ii) differential U-tube manometer. **(06 Marks)**

b. What is capillarity? Derive an expression for capillary rise and a liquid in a glass tube. **(04 Marks)**

c. A U tube differential manometer connects two pipes A and B. Pipe A contains carbon tetra chloride having specific gravity 1.594 under a pressure of 117.72 kN/m^2 and pipe B contains oil of specific gravity 0.8 under a pressure of 117.72 kN/m^2. The pipe A lies 2.5 m above pipe B. Find the difference in pressure measured by mercury as fluid filling U-tube. Assume mercury in the right limb is 50 cm below centre of pipe B. **(06 Marks)**

Module-2

3 a. Distinguish between:
i) Steady and unsteady flow
ii) Rotational and irrotational flow **(04 Marks)**

b. Derive the expressions for total pressure and centre of pressure for a plane surface submerged vertically in a liquid. **(06 Marks)**

c. A circular opening 3m diameter, in a vertical side of a tank is closed by a disc of 3m diameter which can rotate about a horizontal diameter. Calculate: (i) The force on the disc, and (ii) The torque required to maintain the disc in equilibrium in vertical position when the head of water above the horizontal diameter is 6m. **(06 Marks)**

OR

4 a. Define the terms velocity potential function and stream function. **(04 Marks)**

b. Derive an expression for continuity equation for a three dimensional flow. **(06 Marks)**

c. A stream function in a two dimensional flow is $\psi = 2xy$. Show that the flow is irrotational and determine the corresponding velocity potential ϕ. **(06 Marks)**

Module-3

5 a. What is pitot tube? How will you determine velocity using pitot tube? **(04 Marks)**

b. State and prove Bernoulli's theorem for steady flow of an incompressible fluid. **(06 Marks)**

c. The water is flowing through a tapper pipe of length 100 m having diameters 600 mm at the upper end and 300 mm at the lower end at the rate of 50 litres/s. The pipe has a slope of 1 in 30. Find the pressure at the lower end if the pressure at the higher end is 196.2 kPa. **(06 Marks)**

OR

6 a. Define the terms: i) forced vertex flow and ii) free vertex flow. **(04 Marks)**

b. What is venturimeter? Derive an expression for discharge through a venturimeter. **(06 Marks)**

c. A pipe of 300 mm diameter conveying 300 litres/s of water has a right angled bend in a horizontal plane. Find the resultant force exerted on the bend if the pressure at inlet and outlet of bend are 245.25 kPa and 235.44 kPa. **(06 Marks)**

Module-4

7 a. Explain different hydraulic coefficient and establish the relation between them. **(04 Marks)**

b. Derive an expression for discharge over a triangular notch. **(06 Marks)**

c. The head of water over an orifice of diameter 100 mm is 5m. The water coming out from the orifice is collected in a circular tank of diameter 2 m. The rise of water level in circular tank is 450 mm in 30 seconds. Also the coordinates at a certain point on the jet, measured from vena-contracta are 1000 mm horizontal and 52 mm vertical. Find the hydraulic coefficients C_V, C_d and C_c. **(06 Marks)**

OR

8 a. Explain the terms:
   i) Velocity of approach
   ii) Effect of end contractions in notches **(04 Marks)**

b. What is Cipolletti notch? Derive an expression for discharge over a Cipolletti notch. **(06 Marks)**

c. Water flows over a rectangular weir 1.2m wide at a depth of 15 cm and afterwards passes through a triangular right angled weir. Taking coefficient of discharge for rectangular Weir 0.62 and for triangular Weir 0.59 find the depth over the triangular Weir. **(06 Marks)**

Module-5

9 a. Explain briefly:
   i) Hydraulic gradient line and
   ii) Energy gradient line **(04 Marks)**

b. Derive an expression for head loss due to friction in pipes. **(06 Marks)**

c. A rigid pipe conveying water is 3200 m long. The velocity of flow is 1.2 m/s. Calculate the rise of pressure behind a valve at the lower end if it is closed (i) in 20 seconds (ii) in 3 seconds. Take bulk modulus and water equal to 2000 N/mm^2. **(06 Marks)**

OR

10 a. Explain briefly the phenomenon of water hammer. **(04 Marks)**

b. Derive an expression for head loss due to sudden enlargement in a pipe flow. **(06 Marks)**

c. At a sudden enlargement of a water main from 240 mm to 480 mm diameter, the hydraulic gradient rises by 10 mm. Estimate the rate of flow. **(06 Marks)**

* * * * *

CBCS SCHEME

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

15CV34

Third Semester B.E. Degree Examination, June/July 2018
Basic Surveying

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define surveying. **(02 Marks)**

b. What are the primary divisions of surveying? Explain briefly. **(05 Marks)**

c. The area of the plan of an old survey plotted to a scale of 10 meters to 1cm measures now as 100.2 sq.cm as found by a planimeter. The plan is found to have shrunk, so that a line originally 10cm long now measures 9.7cm only. There was a note on the plan that the 20m chain used was 8cm too short. Find the true area of plan. **(09 Marks)**

OR

2 a. By means of neat sketches show any six conventional symbols used in surveying. **(06 Marks)**

b. Define precision and accuracy. **(02 Marks)**

c. In passing an obstacle in the form of a pond, stations A and D on the main line were taken on the opposite sides of pond, on the left of AD, a line AB, 200m long was laid down and a second line AC, 250m long was ranged on right of AD points B, D and C being in the same straight line, BD and DC were then chained and found to be 125m and 150m. Find the length AD. **(08 Marks)**

Module-2

3 a. Differentiate between prismatic and surveyors compass (any 3). **(06 Marks)**

b. Convert the whole circle bearings to quadrantal bearings :
i) 22°30′ ii) 170°12′ iii) 211°54′ iv) 327°24′. **(02 Marks)**

c. Determine the value of included angles in a closed compare surrey ABCD conducted in clockwise direction given the following data. Apply the check.

Line	FB
AB	40°
BC	70°
CD	210°
DA	280°

(08 Marks)

OR

4 a. Define : i) Face left ii) Transiting iii) Swining as applied to theodolite surveying. **(03 Marks)**

b. With a neat sketch, explain the method of measurement of horizontal angle by repletion method. State the errors eliminated by this method. **(05 Marks)**

c. The following angles were observed in the clockwise direction in an open traverse.
∠ABC = 124°15′, ∠BCD = 156°30′, ∠CDE = 102°00′, ∠DEF = 95°15′, ∠EFG = 215°45′
The magnetic bearing of the line AB = 240°30′ what would be the bearing of line FG? **(08 Marks)**

Module-3

5 a. Explain closed and open traversed with neat sketches. **(06 Marks)**

b. State Bowditch's and Transil rule. **(04 Marks)**

c. Calculate latitudes, departures and closing error for the following traverse conducted at a place.

Line	Length (m)	Web
AB	89.31	45°10′
BC	219.76	72°05′
CD	151.18	161°52′
DE	159.10	228°43′
EA	232.26	300°42′

(06 Marks)

OR

6 a. Define tacheometry under what circumstances it is used? **(04 Marks)**

b. State any four characteristics of a tacheometer. **(02 Marks)**

c. A tacheometer is setup at an intermediate point on a traverse course PQ and the following observations are made on a vertically held staff.

Staff stn	Vertical angle	Staff intercept	Axial hair reading
P	+8°36′	2.350	2.105
Q	+6°6′	2.055	1.895

The instrument is fitted with an anallatic lens and the constant is 100.000. Compute the length of PQ and reduced level of Q, if that of P being 321.50 meters. **(10 Marks)**

Module-4

7 a. Define the terms : i) Back sight ii) Fore sight iii) Intermediate sight iv) change point. **(04 Marks)**

b. Compare height of instrument method and rise and fall method of reduction of levels. **(04 Marks)**

c. The following consecutive readings were taken with a level and 5m leveling staff on continuously sloping ground at a common interval of 20 meters :

0.835, 1.030, 1.925, 2.825, 3.730, 4.685, 0.625, 2.005, 3.110 and 4.485m.

The reduced level of first point was 208.125m. Rule outer page of level field book and enter the readings. Calculate the reduced levels of points by rise and fall method and apply check. Calculate also the gradient of line joining the first and last point. **(08 Marks)**

OR

8 a. Explain reciprocal leveling. **(04 Marks)**

b. An observer standing on the deck of ship just sees a light house. The top of light house is 42m above the sea level and the height of observers Eye is 6m above the sea level. Find the distance of observes from the light house. **(05 Marks)**

c. In order to ascertain the elevation of the top (Q) of the signal on a hill, observations were made from two instrument stations P and R at a horizontal distance 100m apart, the stations P, R, and Q are in a line. The angles of elevation of Q at P and R were 28°42′ and 18°6′ respectively. The staff reading on a bench mark of elevation 287.28m from P = 2.870, from R = 3.750. Determine the Elevation of foot of signal if height of signal = 3M. **(07 Marks)**

Module-5

9 a. The following perpendicular offsets were taken from a chain line to an irregular boundary.

Chainage (m)	0	30	60	90	120	150	180	210
Offset length (m)	0	2.65	3.80	3.75	4.65	3.60	5.00	5.80

Calculate the area between the chain lines and irregular boundary, first and last offsets by i) Trapezoidal rule ii) Simpson's rule. **(08 Marks)**

b. Calculate the area enclosed by a traverse ABCD for the following data : Assume co-ordinater as (100, 200).

Line	Latitude (m)	Departure(m)
AB	+32.05	+40.20
BC	–3	+92.00
CD	–97.85	+6.402
DE	–15.8	–107.00
EA	+84.6	–31.602

(08 Marks)

OR

10 a. With neat sketches explain any six characteristics of contours. **(06 Marks)**

b. Calculate the area of zero circle with the following data :

IR	FR	Position anchor point	Remarks
6.520	2.724	Outside the fig	Zero of counting dise crossed index once clockwise
1.222	7.720	Inside the fig	Zero of counting dise crossed and index twice anticlockwise

Assume that tracing arm of planimeter was so set that tone revolution of measuring wheel measures 100cm^2 on paper. **(06 Marks)**

c. Write short notes on :

i) Interpolation of contours

ii) Contour gradient. **(04 Marks)**

* * * * *

CBCS SCHEME

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

15CV/CT35

Third Semester B.E. Degree Examination, June/July 2018
Engineering Geology

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Describe the importance and applications of geology in civil engineering practices. **(05 Marks)**

b. Describe the internal structure and composition of the earth with a neat diagram. **(05 Marks)**

c. Define what is a mineral? Describe how minerals are classifieds. Describe the physical properties. Luster and fracture with mineral examples. **(06 Marks)**

OR

2 a. Define what is rock? Classify the different types of rocks and describe how it is formed. Give examples. Explain the rock cycle. **(06 Marks)**

b. What is fold? Describe with a neat diagram the different parts of a fold. **(05 Marks)**

c. What are joints? Describe the classification of joints. Explain the different types joints present in igneous, sedimentary and metamorphic rocks. **(05 Marks**

Module-2

3 a. What is fault? Draw a net diagram of the fault and describe the different parts. Write the classification of fault with neat sketch. **(08 Marks)**

b. Describe the geological considerations of joints and folds in the construction of dams and tunnels. **(08 Marks)**

OR

4 Describe in detail with neat sketches concordant and discordant igneous intrusions. **(16 Marks)**

Module-3

5 a. What is weathering? Describe in detail about physical weathering and chemical weathering. **(08 Marks)**

b. Give a detailed account of geologic work of rivers. **(08 Marks)**

OR

6 a. What is earth quake? Write the causes and effects. **(08 Marks)**

b. What are seismic waves? Describe in detail the different seismic waves. **(08 Marks)**

Module-4

7 What is an aquifer? Explain the different types of aquifers and its properties. **(16 Marks)**

OR

8 What is ground water investigation? Describe the different methods involved in selection of well sites. Describe the electrical resistivity method of selecting a well site. **(16 Marks)**

Module-5

9 What is remote sensing? Explain the basic concepts of remote sensing with a neat sketch. Explain the advantages and disadvantages of remote sensing. **(16 Marks)**

OR

10 Describe in detail the impact of mining, quarrying and reservoirs on environment. **(16 Marks)**

* * * * *

CBCS SCHEME

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

15CV36

Third Semester B.E. Degree Examination, June/July 2018
Building Materials and Construction

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. What are the requirements of good building stone? Explain the dressing of stones. **(08 Marks)**

b. List the various tests conducted on coarse aggregate. Explain any one of them in brief. **(08 Marks)**

OR

2 a. Explain the different types of preservations commonly adopted in the preservation of stones. **(08 Marks)**

b. What are the requirements of good bricks and explain the field and laboratory tests on bricks. **(08 Marks)**

Module-2

3 a. Explain the essential requirements of a good foundation. **(08 Marks)**

b. With the help of neat sketches explain the various types of Joints used in stone masonry. **(08 Marks)**

OR

4 a. What is safe bearing capacity (SBC) of a soil? Briefly explain various methods adopted to improve SBC. **(08 Marks)**

b. Explain the following :
(i) Header, (ii) Flemish bond, (iii) Load bearing, (iv) Partition walls. **(08 Marks)**

Module-3

5 a. Define lintels and mention its function and classification. **(08 Marks)**

b. Sketch a King post truss made of timber, which has to support tile roofing. Name the components. **(08 Marks)**

OR

6 a. Give the classification of arches and explain stability of an arch. **(08 Marks)**

b. Discuss the various flooring materials used and explain any two of them in detail. **(08 Marks)**

Module-4

7 a. Briefly explain the factors to be considered while locating the position of doors and windows. **(08 Marks)**

b. With the help of a neat sketch briefly explain the dog legged staircase and its components. **(08 Marks)**

OR

8 a. With the help of a neat sketch explain the following :
(i) Wooden paneled door (ii) Collapsible door. **(08 Marks)**

b. Write a note on different types of stairs and explain the requirements of a good stair. **(08 Marks)**

Module-5

9 a. Briefly explain the purpose of plastering and explain the various methods of plasters. **(08 Marks)**

b. Explain in brief causes and effects of dampners in a building. **(08 Marks)**

OR

10 a. What are the objects of plastering and painting. **(08 Marks)**

b. Describe the different types of paints available in market and their specific usage. **(08 Marks)**

* * * * *

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

10CV/EV/CT33

Third Semester B.E. Degree Examination, June/July 2018
Strength of Materials

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO full questions from each part.***

PART – A

1 a. Define: i) Hooke's law and ii) Modulus of rigidity. **(04 Marks)**

b. Derive an relation between modulus of rigidity, modulus of elasticity and Poisson's ratio. **(06 Marks)**

c. A stepped bar is subjected to an external loading as shown in Fig.Q.1(c). Calculate the change in length of the bar. Take E for steel = 200GPa, E for aluminium = 70GPa and E for copper = 100GPa. **(05 Marks)**

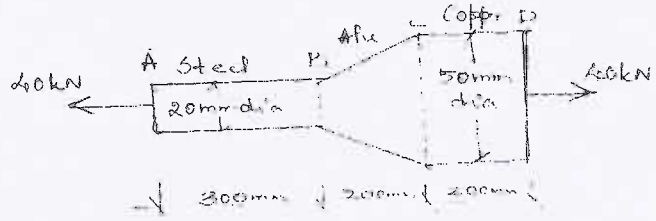

Fig.Q.1(c)

d. A solid alloy bar of 40mm diameter is used as tie. If the permissible tensile stress in material is 32MN/m^2, determine the capacity of the bar. If a hollow steel bar with internal diameter 20mm is used instead of solid bar, determine its external diameter if the permissible stress is 150 MN/m^2. **(05 Marks)**

2 a. Define composite section. **(02 Marks)**

b. A reinforced concrete column of size 0.3m × 0.3m contains 4no. 40mm diameter rods and subjected to a load of 500kN. Determine the stresses in concrete and steel if the modular ratio of steel to concrete is 15. **(08 Marks)**

c. A brass bar of 25mm diameter is enclosed within a steel tube of internal diameter 25mm and external diameter 50mm, the length of the composite bar is 1m and further the ends are rigidity held by means of rigid collars. Find the stresses induced in the materials when the temperature rises by 100°C. Find the final stresses if the composite bar is subjected to a tensile load of 600kN. E for steel = 200GPa; α for steel = 11.6×10^{-6}/°C, E for brass = 100GPa; α for brass = 18.7×10^{-6}/°C. **(10 Marks)**

3 a. Define principal stress and principal planes. **(03 Marks)**

b. Derive the expressions for normal and tangential stress components on any arbitrary plane which is inclined at an 'θ' with horizontal in a two dimensional stress system. **(07 Marks)**

c. At a point in an elastic material the stresses on two perpendicular directions are 80N/mm^2 compressive along X-direction, 60N/mm^2 tensile along Y-direction with a shear stress of 40N/mm^2. Find the normal and tangential stresses on a plane which is making an angle of 40° with the plane on which the tensile stress acts. Also find the magnitude and direction of principal stress. **(10 Marks)**

4 a. Define: i) Bending moment ii) Shear force. **(02 Marks)**

b. Derive the relationship between bending moment, shear force and loading. **(04 Marks)**

c. Draw the shear force and bending moment diagram with salient values for the overhanging beam loaded as shown in Fig.Q.4(c). Also locate the point of contra flexures, of any **(14 Marks)**

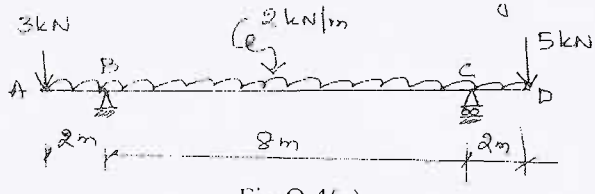

Fig.Q.4(c)

PART – B

5 a. Show that for a rectangular cross section shear stress distribution varies parabolically across the depth. Further show that maximum shear stress is 1.5 times average shear stress. **(06 Marks)**

b. A cantilever beam 3m long is subjected to a udl of 30kN/m over the entire span. The allowable working stress in compression and tension is 150MPa. If the cross section is to be of rectangular, determine the dimensions. Take the depth of the c/s as twice the width. **(14 Marks)**

6 a. Derive $EI\frac{d^2y}{dx^2} = +M$ with usual notations. **(08 Marks)**

b. A simply supported beam 'AB' of span $\frac{'2L'}{3}$ has an overhang BC of length $\frac{'L'}{3}$. The beam supports a uniform load of intensity 'q' per meter run over (Refer Fig.Q.6(b)).

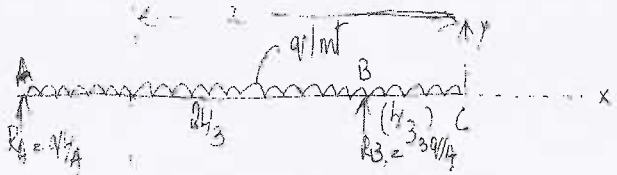

Fig.Q.6(b)

Its entire length. Determine deflection and slope at free and 'C'. **(12 Marks)**

7 a. State the assumptions made in theory of pure torsion. **(03 Marks)**

b. Prove that a hollow shaft is stronger and stiffer than the solid shaft of the same material, length and weight. **(07 Marks)**

c. A hollow steel shaft transmits 200kW of power at 150rpm. The total angle of twist in a length of 5m of the shaft is 3°. Find the inner and outer diameters of the shaft if the permissible shear stress is 60MPa. Take G = 80 GPa. **(10 Marks)**

8 a. Derive the Euler's expression for crippling load for column with one end fixed and other end hinged. **(08 Marks)**

b. Determine the Euler's crippling load for the column of steel of diameter 50mm and length 4m with both ends hinged. Further compare the same with Rankine's formula. Take E = 200GPa, factor of safety = 3; Rankine's constants σ_c = 320 MPa ; a = 1/7500. **(12 Marks)**

* * * * *

CBCS SCHEME

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

15CV42

Fourth Semester B.E. Degree Examination, June/July 2018
Analysis of Determinate Structures

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. Assume any missing data suitably.

Module-1

1 a. Distinguish between Statically Determinate Beams and Indeterminate Beams with examples. **(05 Marks)**

b. Define Degree of freedom. What is the degree of freedom for a (i) Fixed support (ii) Hinged support. **(03 Marks)**

c. Determine static and kinematic indeterminacy for the following shown in Fig.Q1(c).

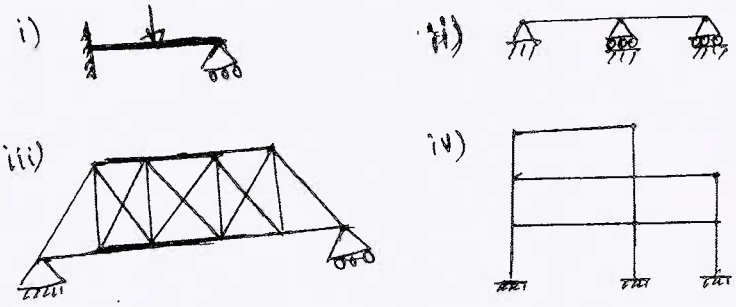

Fig.Q1(c) **(08 Marks)**

OR

2 a. Find the forces in all members of the pin-jointed truss shown in Fig.Q2(a) by method of joints. **(08 Marks)**

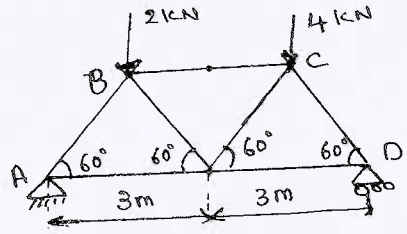

Fig.Q2(a)

b. Determine the nature and magnitude of forces in members FE, FD, CD by method of sections for the truss shown in Fig.Q2(b). **(08 Marks)**

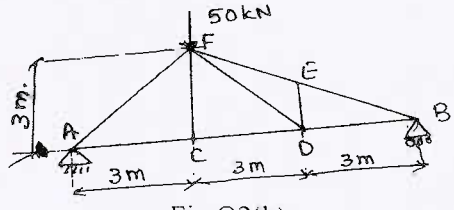

Fig.Q2(b)

Module-2

3 a. Derive Moment Curvature equation. **(06 Marks)**

b. A beam of length 6m is simply supported at its ends and carries a point load of 40 kN at a distance of 4m from the left support. Find the slopes at the supported ends and deflection under the load by Maculay's method. **(10 Marks)**

OR

4 a. Find the slope and deflection at the free end of the cantilever beam shown Fig.Q4(a) by moment area method. **(08 Marks)**

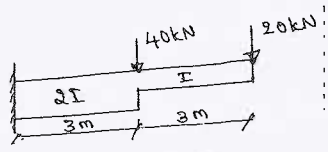

Fig.Q4(a)

b. Find the deflection under the concentrated load for the beam shown in Fig.Q4(b) using conjugate beam method. EI = 40000 kN-m^2. **(08 Marks)**

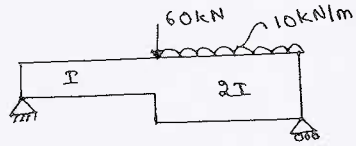

Fig.Q4(b)

Module-3

5 a. State (i) Castigliano's theorems (ii) Principal of virtual work. **(08 Marks)**

b. Determine the vertical deflection of joint C of the truss shown in Fig.Q5(b). Take E = 200×10^6 kN/m^2 and cross sectional area of each bar as 150×10^{-6} m^2. **(08 Marks)**

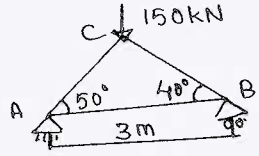

Fig.Q5(b)

OR

6 a. Determine the deflection of the cantilever beam shown in Fig.Q6(a) at its free end, by Castigliano's method. Take EI = 12000 Nm^2. **(06 Marks)**

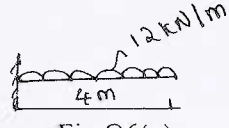

Fig.Q6(a)

b. Determine the vertical and horizontal deflection at end C of the bent frame shown in Fig.Q6(b) by unit load method. Take E = 200 GPa and I = $6(10)^7$ mm^4. **(10 Marks)**

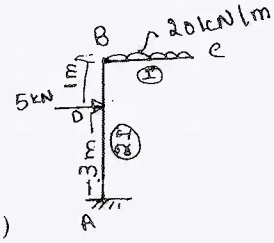

Fig.Q6(b)

Module-4

7 A three hinged parabolic arch has a span of 24m and a central rise of 4m. It carries a concentrated load of 75 kN at 18m from the left support and uniformly distributed load of 45 kN/m over the left half of the portion. Find out the resultant reactions. Also determine the bending moment, normal thrust and radial shear at a section 6m from the left support. **(16 Marks)**

OR

8 A suspension cable of snap 100m and dip 10m carries a uniformly distributed load of 10 kN/m over the full span. Find

(i) Maximum and minimum Tension in the cable and its inclination.
(ii) Minimum required cross sectional area of the cable if the allowable stress is 280 MPa.
(iii) Length of the cable
(iv) Vertical and horizontal forces transmitted to the supporting pylons (a) if the cable passed over a smooth pulley (b) if the cable is clamped to a saddle with roller on the top of the pier.

The anchor cable makes 30° to the horizontal at the pylons. **(16 Marks)**

Module-5

9 A simple girder of 20m span is traverssed by a moving uniformly distributed load of 6m length with an intensity of 20 kN/m from left to right. Find the maximum bending moment and maximum positive and negative shear forces at sections 4m from left support. Also find the absolute maximum bending moment that may occur anywhere in the girder. **(16 Marks)**

OR

10 Using relevant influence line diagram find (i) Maximum bending moment (ii) The maximum positive and negative shear forces at 4m from left support of a simply supported girder of span 10m, when a train of 4 wheel loads of 10 kN, 15 kN, 30 kN and 30 kN spaced at 2m, 3m and 3m respectively cross the span left to right with 10 kN load leading. [Refer Fig.Q10] **(16 Marks)**

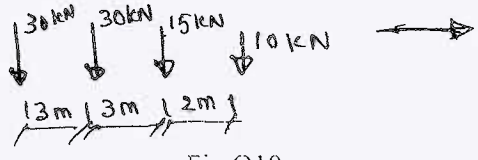

Fig.Q10

* * * * *

CBCS Scheme

USN | | | | | | | | | | 15CV42

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Analysis of Determinate Structures

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Differentiate between statically determinate and indeterminate structures. **(06 Marks)**

b. What are linear and non-linear systems? Explain. **(02 Marks)**

c. Determine the degree of static indeterminaly for the following structures [Fig.Q1(c)]:

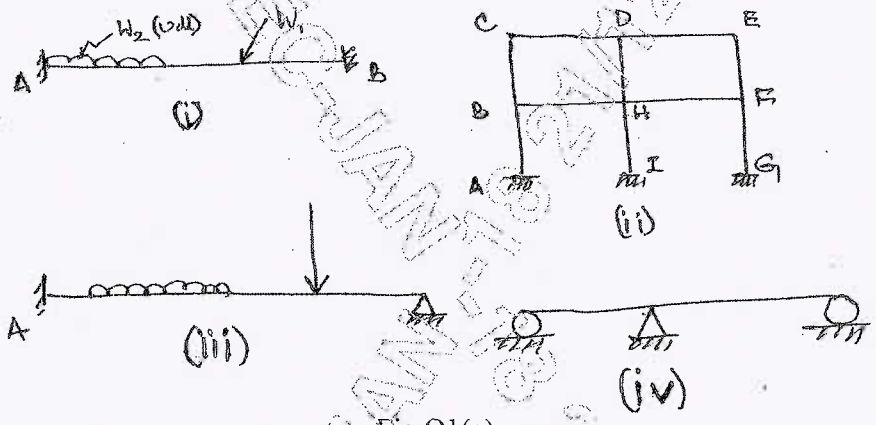

Fig.Q1(c) **(08 Marks)**

OR

2 Determine the forces in all the members of the truss shown in the Fig.Q2 by the method of joints and verify the forces in members BC, CF and FE by the method of sections.

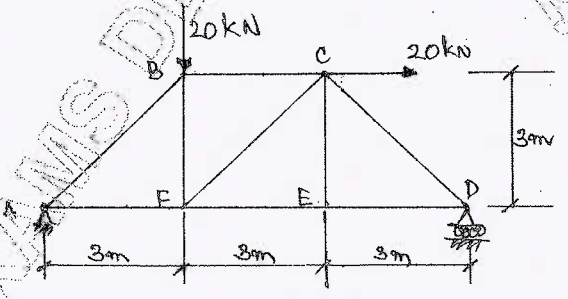

Fig.Q2 **(16 Marks)**

Module-2

3 a. Derive the moment-curvature equation for deflection. **(06 Marks)**

b. A simply supported beam AB has a span of 5m and carries a point load of 50 kN at a distance of 3m from left end A as shown in Fig.Q3(b). Find the deflection under the load and also maximum deflection in the beam.

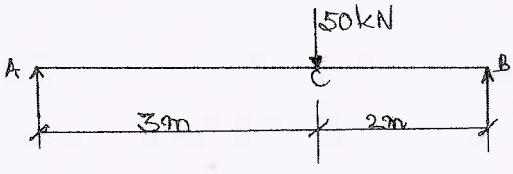

Fig.Q3(b) **(10 Marks)**

OR

4 a. Determine the slope and deflection at the free end of a cantilever shown in Fig.Q4(a) by the moment area method.

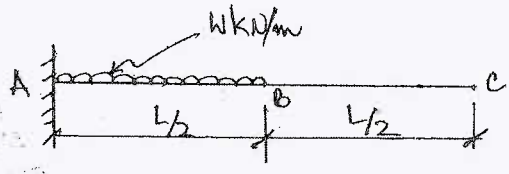

Fig.Q4(a) **(08 Marks)**

b. Determine the slope and deflection under the load for the beam shown in Fig.Q4(b) using conjugate beam method.

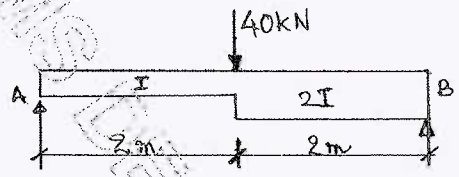

Fig.Q4(b) **(08 Marks)**

Module-3

5 a. Obtain the expression for strain energy stored in a member when it is subjected to axial load. **(08 Marks)**

b. Determine the deflection under the given 60 kN load acting on the beam as shown in Fig.Q5(b) by strain energy method.

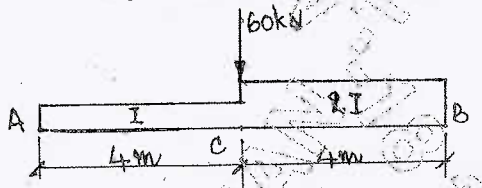

Fig.Q5(b) **(08 Marks)**

OR

6 a. Find the value of vertical deflection at C for the structure shown in Fig.Q6(a) by Castiglione's theorem.

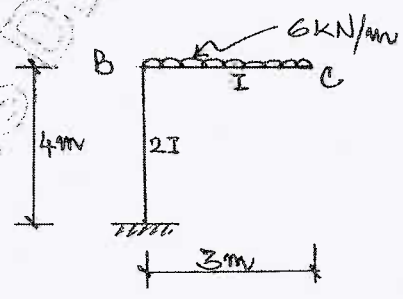

Fig.Q6(a) **(08 Marks)**

b. Determine the vertical and horizontal deflections at joint C of the truss shown in Fig.Q6(b). The cross sectional area of inclined member (tie) is 2000 mm^2 while the area of horizontal member is 1600 mm^2. Take E = 200 kN/mm^2.

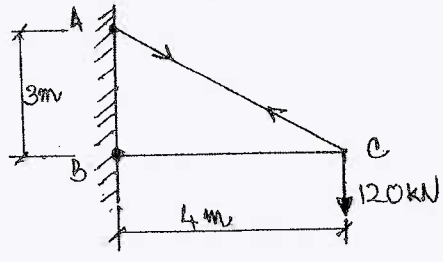

Fig.Q6(b) **(08 Marks)**

Module-4

7 A three hinged parabolic arch has a span of 30 m and rise of 6m. It carries a udl of 3 kN/m over the left half of the span and a point load of 6 kN at 9m from right end. Find the BM, normal thrust and radial shear at a section of 9m from left end support. Also find the maximum bending moment along the span. **(16 Marks)**

OR

8 A cable is suspended between two points A and B 120 m apart and a central dip of 8m. It carries a udl of 20 kN/m. Determine:

i) The maximum and minimum tension in the cable.
ii) Length of the cable.
iii) The size of cable if the permissible stress of cable material is 200 N/mm^2. **(16 Marks)**

Module-5

9 a. Define a influence line diagram and mention its applications. **(06 Marks)**

b. Draw the influence line diagrams for:

i) Reactions at supports of a simply supported beam.
ii) Shear force of a simply supported beam carrying concentrated unit load. **(10 Marks)**

OR

10 For a simply supported beam of span 25m with the series of concentrated loads to be taken as rolling load system as shown in Fig.Q10. Compute the following by influence line principles.

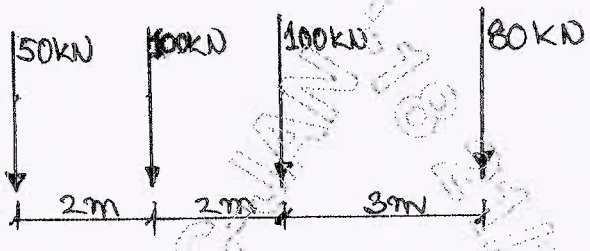

Fig.Q10

i) Maximum reactions.
ii) Maximum bending moment at 8 m from left support. **(16 Marks)**

* * * * *

CBCS Scheme

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

15CV43

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Applied Hydraulics

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. Assume missing data suitably.

Module-1

1 a. Using Buckingham's π-theorem, show that the velocity through a circular orifice is given by $V = \sqrt{2gH}\,\phi\left(\frac{D}{H}, \frac{\mu}{\rho VH}\right)$, where H is the head causing flow, D is the diameter of the orifice, μ is coefficient of viscosity, ρ is the mass density and g is the acceleration due to gravity. **(10 Marks)**

b. A pipe of diameter 1.5 m is required to transport an oil of specific gravity 0.9 and viscosity 3×10^{-2} poise at the rate of 3000 *l*/s. Tests were conducted on a 15 cm diameter pipe using water at 20°C. Find the viscosity and rate of flow in the model. Viscosity of water at 20°C = 0.01 Poise. **(06 Marks)**

OR

2 a. A solid cylinder of diameter 4 m has a height of 4m. Find the meta centric height of the cylinder, if the specific gravity of the material of cylinder = 0.6 and it is floating in water with its axis vertical. State whether the equilibrium is stable or unstable. **(08 Marks)**

b. A 1:40 model of an ocean tanker is dragged through fresh water at 2 m/s with a total measured drag of 12 N. The skin drag coefficient 'f' for model and prototype are 0.03 and 0.002 respectively in the equation $R_f = f.AV^2$. The wetted surface are of the model is 25 m^2. Determine the total drag on the prototype and power required to drive the prototype. Take $\rho_p = 1030$ kg/m^3 and $\rho_m = 1000$ kg/m^3. **(08 Marks)**

Module-2

3 a. What is meant by economical section of a channel? Derive the condition for the most economical rectangular section. **(08 Marks)**

b. The discharge of water through a rectangular channel of width 8m is 15 m^3/s. When depth of flow of water is 1.2 m, calculate:
i) Specific energy of the flowing water.
ii) Critical depth and critical velocity
iii) Value of minimum specific energy **(08 Marks)**

OR

4 a. Define specific energy, draw specific energy curve and then derive expressions for critical depth and critical velocity. **(08 Marks)**

b. Find the diameter of a circular sewer pipe which is laid at a slope of 1 in 8000 and carries a discharge of 800 *l*ps when flowing half full. Take the value of Manning's N = 0.02. **(08 Marks)**

Module-3

5 a. A hydraulic jump forms at the downstream end of spillway carrying 17.93 m^3/s discharge. If the depth before jump is 0.8m, determine the depth after the jump and energy loss. Consider 1 m width of channel. **(06 Marks)**

b. Determine the length of the back water curve caused by an afflux of 2m in a rectangular channel of width 40 m and depth 2.5 m. The slope of the bed is given as 1 in 11000. Take Manning's N = 0.03. **(10 Marks)**

OR

6 a. Find the slope of the free water surface in a rectangular channel of width 20 m having a depth of flow 5m. The discharge through the channel is 50 m^3/s. The bed of the channel is having a slope of 1 in 4000. Take the value of Chezy's constant C = 60. **(08 Marks)**

b. What is gradually varies flow and derive an expression for gradually varied flow? Also mention the assumptions mode for derivation. **(08 Marks)**

Module-4

7 a. A jet of water strikes an unsymmetrical moving curved vane tangential at one of the tips. Derive an expression for the force exerted by the jet in the horizontal direction of motion of vane. Also describe the velocity and obtain the expression for work done per second and efficiency. **(08 Marks)**

b. Draw a neat sketch of hydroelectric power plant and mention the function of each component. **(08 Marks)**

OR

8 a. A pelton wheel has a mean bucket speed of 10 m/s with a jet of water flowing at the rate of 700 l/s under a head of 30 m. The buckets deflect the jet through an angle of 160°. Calculate the power given by water to the runner and the hydraulic efficiency of the turbine. Assume coefficient of velocity as 0.98. **(08 Marks)**

b. Give a detailed classification of turbines. Also discuss about different heads and efficiencies. **(08 Marks)**

Module-5

9 a. Draw a neat sketch of Kaplan turbine and explain the function of each part in brief. **(08 Marks)**

b. Derive an expression for the minimum starting speed of a centrifugal pump. **(08 Marks)**

OR

10 a. A Francis turbine with overall efficiency of 75% required to produce 148.25 KW power. It is working under a head of 7.62 m. The peripheral velocity = $0.26\sqrt{2gh}$ and radial velocity of flow is $0.96\sqrt{2gh}$. The wheel runs at 150 rpm and hydraulic losses in the turbine are 22% of the available energy. Assume radial discharge. Determine:

i) Guide blade angle at the inlet
ii) The wheel vane angle at the inlet
iii) Diameter of the wheel at the inlet
iv) Width of the wheel at the inlet **(08 Marks)**

b. Define multistage centrifugal pump and with neat sketch, explain the multistage centrifugal pumps used for (i) high heads (ii) high discharge. **(08 Marks)**

* * * * *

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

10CV45

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Hydraulic and Hydraulic Machines

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. Assume missing data suitably and specify.

PART – A

1 a. State and explain Buckingham's π – method. Give the guidelines for selection of repeating variables. **(06 Marks)**

b. Explain Geometric similarity, Kinematic similarity and Dynamic similarity. **(06 Marks)**

c. Using Buckingham's π – theorem, show that the discharge (Q) over a spillway is given by $Q = VD^2 f\left[\frac{\sqrt{gD}}{V}, \frac{H}{D}\right]$, where V is velocity of flow, D is depth at the throat , H is Head of water and g is acceleration due to gravity. **(08 Marks)**

2 a. Give the differences between Open channel flow and Pipe flow. **(04 Marks)**

b. Derive the expression for velocity of uniform flow in open channel flow given by Chezy. **(08 Marks)**

c. Determine the dimensions of most economical trapezoidal channel section to carry a discharge of 25 cumecs with a velocity of 1.2 m/sec. The side slopes of the channel are 2V : 3H. Find also the necessary bed slope required. Take Manning's n = 0.025. **(08 Marks)**

3 a. Explain the specific energy diagram, with a neat sketch. **(05 Marks)**

b. Obtain the expression for loss of energy head for a hydraulic jump in a rectangular channel. **(07 Marks)**

c. A 8m wide channel conveys 15m^3/s of water at a depth of 1.2m. Calculate i) Specific energy of the flowing water ii) Critical depth , Critical velocity and Minimum specific energy. **(08 Marks)**

4 a. Give the practical applications of Impulse momentum principle. **(04 Marks)**

b. Obtain the expression for efficiency in case of jet striking series flat plates mounted on the periphery of a wheel and value of maximum efficiency. **(08 Marks)**

c. A jet of water 2.5cms diameter strikes a hinged square plate at its centre with a velocity of 20m/s. The plate is deflected through an angle of 30^0. Find the weight of the plate. If the plate is not allowed to swing, find the force required at the lower edge of the plate to keep the plate in vertical position. **(08 Marks)**

PART – B

5 a. Obtain the expression for efficiency when jet striking an unsymmetrical moving curved vane tangentially at one of the tips. **(10 Marks)**

b. A jet of water of diameter 50mm, having a velocity of 20m/s strikes a curved vane which is moving with a velocity of 10m/s in the direction of the jet. The jet leaves the vane at an angle 60^0 to the direction of motion of vane at outlet. Determine
i) the force exerted by the jet in the direction of the motion and
ii) work done per second by the jet. **(10 Marks)**

6 a. Explain different efficiencies in case of turbine. **(08 Marks)**

b. Draw a neat sketch of Pelton wheel turbine and name the different parts. **(04 Marks)**

c. A Pelton wheel is to be designed for the following specifications :
Power = 9560 kW ; Head = 350 meters ; Speed = 750 rpm ;
Overall efficiency = 85% ; Jet ratio = 6. Determine the following i) The wheel diameter ii) Diameter of the jet and iii) the number of jets required. **(08 Marks)**

7 a. Explain Cavitation in turbines. **(06 Marks)**

b. Define Efficiency of draft tube and give its mathematical expression. **(04 Marks)**

c. A Kaplan turbine runner is to be designed to develop 10,000 kW. The net available head is 6.0m. The speed ratio is 2.09. The flow ratio is 0.68. The overall efficiency is 80% and diameter of boss is 1/3 the diameter of the runner. Find the diameter of the runner , its speed and the specific speed of the turbine. **(10 Marks)**

8 a. What is Priming of a centrifugal pump? Why it is necessary? **(06 Marks)**

b. Obtain the expression for minimum starting speed in a centrifugal pump. **(04 Marks)**

c. The outer diameter of an impeller of a centrifugal pump is 500mm and its outer width is 50mm. The pump is running at 1000 rpm and is working against a total head of 20m. The vane angle at the outlet is 30^0 and manometric efficiency is 70%. Determine
i) Velocity of flow at the outlet.
ii) The velocity of water leaving the vane.
iii) Angle made by the absolute velocity at outlet with the direction of motion at the outlet.
iv) Discharge. **(10 Marks)**

*****

CBCS Scheme

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

15CV46

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Advanced Surveying

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing one full question from each module.*

Module-1

1 a. List the different methods of setting out simple circular curves. Explain the Linear method of setting out simple curve by the method of offset from long chord. **(06 Marks)**

b. Two tangents intersect at chainage 1000mt. The deflection angle being 28 degree, calculate the necessary data to set out a simple circular curve of 200mt radius by Rankines method of deflection angles. Take per interval as 10mt. **(10 Marks)**

OR

2 a. What is a Transition curve? List the functions and essential requirements of an ideal Transition curve. **(04 Marks)**

b. Two straights with a total deflection angle of 72^0 are to be connected by a compound curve of two branches of equal length. The Radius of the first branch is 300mt and that of the second branch is 400mt, chainage of intersection point is 1500 mt. Calculate the chainage of tangent points and that of Point of Compound Curvature (PIC). **(06 Marks)**

c. Two parallel straight gant apart are to be connected by a Reverse curve. If the distance between the two tangent points is 72mt, find the common radius of the two branches. If however, radius of the first branch is 100mt, find the radius of the second branch. **(06 Marks)**

Module-2

3 a. List the various factors that are to be considered in the selection of site for Base line and stations in Triangulations survey. **(08 Marks)**

b. Write a note on Classifications of Triangulations system. **(08 Marks)**

OR

4 a. State and explain Law of Weights. **(08 Marks)**

b. Find the most probable value of the angles A and B from the following equations :
$A = 40^0\ 15'\ 21.4''$; $B = 45^0\ 12'\ 18.4''$; $A + B = 85^0\ 27'\ 45.2''$. **(08 Marks)**

Module-3

5 a. Define the following terms : i) The a celestrial sphere ii) The azimuth iii) The sensible Horizon iv) The hour angle. **(08 Marks)**

b. The standard time meridian in India is $82^0\ 30'E$. If the standard time at any instant is 20 hours 24 min 6 seconds, find the local mean time for two places having longitudes i) 20^0 E ii) 20^0 W. **(08 Marks)**

OR

6 a. Define the following terms : **(08 Marks)**
i) The visible horizon ii) The Latitude (θ) iii) Hour circle iv) Zenith and Nadir.

b. Find the GMT corresponding to following LMT :
i) 9 hour 10 minutes 12 second AM at a place in longitude $42^0\ 36'$ W.
ii) 4 hour 32 minutes 10 second AM at a place in longitude $56^0\ 32'$ E. **(08 Marks)**

Module-4

7 a. Define the following terms : i) Vertical photograph ii) Flying height iii) Perspective projection iv) Exposure station. **(08 Marks)**

b. A vertical photograph was taken at an altitude of 1200mt above MSL. Determine the scale of the photograph for the terrain lying at elevation of 80mt and 300mt, if the Focal length of the camera is 15cm. **(08 Marks)**

OR

8 a. List the reasons for keeping overlap in photographs. **(06 Marks)**

b. Describe how mosaic differs from a map. **(04 Marks)**

c. The distance from the principal point to an image on a photograph is 6.44cm and the elevation of the object above the datum (sea level) is 250mt. What is the relief displacement at the point if the datum scale is 1 in 10,000 and the focal length of the camera is 20cm? **(06 Marks)**

Module-5

9 a. Explain the working principle of Total station and list the salient features of Total station. **(08 Marks)**

b. Define Remote sensing. List the applications of Remote sensing. **(08 Marks)**

OR

10 a. What is GIS? With a neat sketch, explain the components of GIS. **(08 Marks)**

b. Explain the working principle of GPS and distinguish between hand held GPS and differential GPS. **(08 Marks)**

* * * * *

CBCS SCHEME

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

15CV46

Fourth Semester B.E. Degree Examination, June/July 2018
Advanced Surveying

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define degree of a curve. Establish the relationship between degree of a curve and its radius. **(04 Marks)**

b. Two tangents intersect each other at a chainage of 59 + 60, the deflection angle being 50°30′. It is required to connect the two tangents by a simple curve of 15 chain radius. Taking peg interval of 100 links, calculate the necessary data for setting out the curves by Rankine's method of deflection angles. Take length of the chain as 20m = 100 links. Also write a brief procedure for setting out the curve. **(12 Marks)**

OR

2 a. Distinguish between a compound curve and a reverse curve with sketches. **(06 Marks)**

b. A compound curve consists of two simple circular of radii 350m and 500m, respectively and is to be laid out between two tangents T_1I and IT_2. PQ is the common tangent and D is the point of compound curvature. The angles $\angle IPQ$ and $\angle IQP$ are 55° and 25° respectively. Given the chainage of point of intersection as 1800.00m, calculate the chainages of T_1, T_2 and D. **(10 Marks)**

Module-2

3 a. What are the important factors to be considered in selection of site for a base line? **(06 Marks)**

b. From a triangulation satellite station 'Q' 5.80m away from the main station A, the following directions were observed :
A : 0° 0′ 0″, B : 132° 18′ 30″, C: 232° 24′ 6″, and D : 296° 6′ 11″.
The inter connected base lines AB, AC and AD were measured as 3265.50m, 4022.20m and 3086.40m respectively. Determine the directions of AB, AC and AD. **(10 Marks)**

OR

4 a. Define the terms :
i) True error
ii) Residual error
iii) Conditioned equation
iv) Indirect observation. **(04 Marks)**

b. Three observed angles α, β and γ from a station P with probable errors of measurement are given below :
$\alpha = 78° 12′ 12″ \pm 2″$,
$\beta = 136° 48′ 30″ \pm 4″$,
$\gamma = 144° 59′ 8″ \pm 5″$
Determine their corrected values. **(12 Marks)**

Module-3

5 a. Define the terms :
   i) Celestial sphere
   ii) Hour angle
   iii) Prime vertical
   iv) Latitude of a place. **(04 Marks)**

b. Find the shortest distance between two places A and B given that their latitudes are 12°N and 13° 04′N with respective longitudes 72° 30′ E and 80° 12′ E. **(12 Marks)**

OR

6 a. Briefly explain the solution of spherical triangle by Napiers rule of circular parts. **(06 Marks)**

b. The standard time meridian in India is 80° 30′ E. If the standard time of place is $20^{H}\ 24^{M}\ 06^{S}$, find the local mean time of two places having the longitudes as 20° E and 20° W respectively. **(10 Marks)**

Module-4

7 a. With a neat sketch, derive the expression for the scale of a vertical photograph. **(08 Marks)**

b. A line AB 2.00 kilometer long, lying at an elevation of 500m measures 8.65cm on a vertical photograph of focal length 20cm. Determine the scale of the photograph at an average elevation of 800m. **(08 Marks)**

OR

8 a. Define the terms :
   i) Tilt
   ii) Exposure station
   iii) Principal point
   iv) ISO centre. **(08 Marks)**

b. Mention the reasons for photograph over lap. Justify the same. **(08 Marks)**

Module-5

9 a. Define EDM. **(03 Marks)**

b. Explain the working of remote sensing equipment. **(05 Marks)**

c. What are the advantages of LIDAR technology? **(08 Marks)**

OR

10 a. Explain the working of total station. **(08 Marks)**

b. Explain the civil engineering applications in GIS and remote sensing. **(08 Marks)**

* * * * *

CBCS SCHEME

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

15CV46

Fourth Semester B.E. Degree Examination, June/July 2018
Advanced Surveying

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define degree of a curve. Establish the relationship between degree of a curve and its radius. **(04 Marks)**

b. Two tangents intersect each other at a chainage of 59 + 60, the deflection angle being 50°30′. It is required to connect the two tangents by a simple curve of 15 chain radius. Taking peg interval of 100 links, calculate the necessary data for setting out the curves by Rankine's method of deflection angles. Take length of the chain as 20m = 100 links. Also write a brief procedure for setting out the curve. **(12 Marks)**

OR

2 a. Distinguish between a compound curve and a reverse curve with sketches. **(06 Marks)**

b. A compound curve consists of two simple circular of radii 350m and 500m, respectively and is to be laid out between two tangents T_1I and IT_2. PQ is the common tangent and D is the point of compound curvature. The angles $\angle IPQ$ and $\angle IQP$ are 55° and 25° respectively. Given the chainage of point of intersection as 1800.00m, calculate the chainages of T_1, T_2 and D. **(10 Marks)**

Module-2

3 a. What are the important factors to be considered in selection of site for a base line? **(06 Marks)**

b. From a triangulation satellite station 'Q' 5.80m away from the main station A, the following directions were observed :
A : 0° 0′ 0″, B : 132° 18′ 30″, C: 232° 24′ 6″, and D : 296° 6′ 11″.
The inter connected base lines AB, AC and AD were measured as 3265.50m, 4022.20m and 3086.40m respectively. Determine the directions of AB, AC and AD. **(10 Marks)**

OR

4 a. Define the terms :
i) True error
ii) Residual error
iii) Conditioned equation
iv) Indirect observation. **(04 Marks)**

b. Three observed angles α, β and γ from a station P with probable errors of measurement are given below :
$\alpha = 78° 12′ 12″ \pm 2″$,
$\beta = 136° 48′ 30″ \pm 4″$,
$\gamma = 144° 59′ 8″ \pm 5″$
Determine their corrected values. **(12 Marks)**

Module-3

5 a. Define the terms :
   i) Celestial sphere
   ii) Hour angle
   iii) Prime vertical
   iv) Latitude of a place. **(04 Marks)**

b. Find the shortest distance between two places A and B given that their latitudes are 12°N and 13° 04'N with respective longitudes 72° 30' E and 80° 12' E. **(12 Marks)**

OR

6 a. Briefly explain the solution of spherical triangle by Napiers rule of circular parts. **(06 Marks)**

b. The standard time meridian in India is 80° 30' E. If the standard time of place is $20^{H}\ 24^{M}\ 06^{S}$, find the local mean time of two places having the longitudes as 20° E and 20° W respectively. **(10 Marks)**

Module-4

7 a. With a neat sketch, derive the expression for the scale of a vertical photograph. **(08 Marks)**

b. A line AB 2.00 kilometer long, lying at an elevation of 500m measures 8.65cm on a vertical photograph of focal length 20cm. Determine the scale of the photograph at an average elevation of 800m. **(08 Marks)**

OR

8 a. Define the terms :
   i) Tilt
   ii) Exposure station
   iii) Principal point
   iv) ISO centre. **(08 Marks)**

b. Mention the reasons for photograph over lap. Justify the same. **(08 Marks)**

Module-5

9 a. Define EDM. **(03 Marks)**

b. Explain the working of remote sensing equipment. **(05 Marks)**

c. What are the advantages of LIDAR technology? **(08 Marks)**

OR

10 a. Explain the working of total station. **(08 Marks)**

b. Explain the civil engineering applications in GIS and remote sensing. **(08 Marks)**

* * * * *

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

10CV43

Fourth Semester B.E. Degree Examination, Dec.2017/Jan.2018
Structural Analysis – I

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting at least TWO questions from each part.***
2. ***Assume any missing data suitably.***

PART – A

1 a. Difference between determinate and indeterminate structures. **(05 Marks)**

b. Determine the static and kinematic in determinacy for the following structures shown in Fig.Q1(b)(i). (ii) & (iii). **(06 Marks)**

Fig.Q1(b)(i)

Fig.Q1(b)(ii)

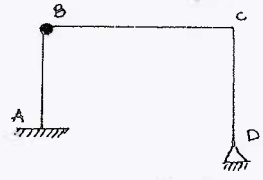

Fig.Q1(b)(iii)

c Derive an expression for strain energy due to bending. **(09 Marks)**

2 a. Determine the slope and deflection at the free end for the cantilever beam shown in Fig.Q2(a). Using moment area method.

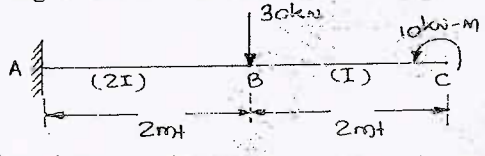

Fig.Q2(a) **(10 Marks)**

b. Determine the slope at the support and deflection under the point load as shown in Fig.Q2(b). Using conjugate beam method.

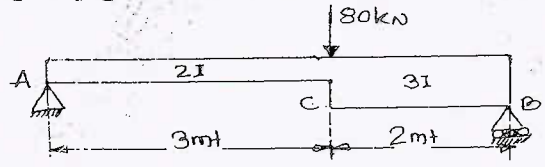

Fig.Q2(b) **(10 Marks)**

3 a. i) State and prove Maxwell's reciprocal theorem. **(06 Marks)**

ii) State Castigliano's first and second theorems. **(04 Marks)**

b. Using Castigliano's theorem, determine the deflection at the load point for the simply supported beam shown in Fig.Q3(b). Take EI is constant.

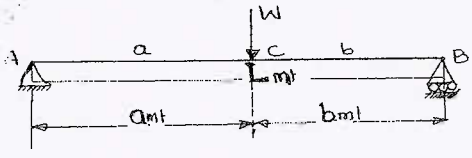

Fig.Q3(b) **(10 Marks)**

4 a. Find the deflection under the concentrated load for beam shown in Fig.Q4(a). Using strain energy method. Take $E = 2 \times 10^8$ kN/m^2, $I = 14 \times 10^{-6}$ m^4.

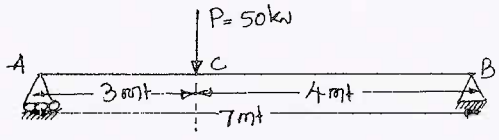

Fig.Q4(a) **(10 Marks)**

b. Determine the horizontal displacement of the roller support end 'A' of the frame shown in Fig.Q4(b) by using unit load method. Take EI = 8000 kN-m^2.

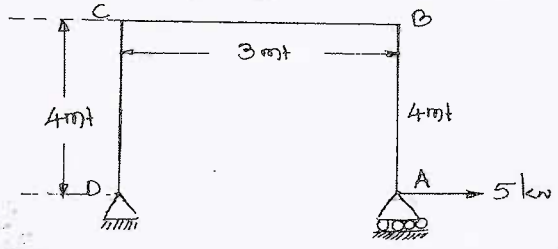

Fig.Q4(b) (10 Marks)

PART – B

5 a. A three hinged parabolic arch has a span of 30 mt and a central rise of 6 mt. The arch carries a UDL of intensity 3 kN/mt. Over left half portion and a concentrated load of 5 kN at a distance of 9 mt from right hand support, compute the bending moment, normal thrust and radial shear at 9 mt from left hand support. (10 Marks)

b. A suspension bridge of 120 mt span has a central dip of 12 mt and a UDL of 15 kN/m of whole span. Determine:

i) The maximum and minimum tension in a cable.

ii) The size of the cable, if the permissible stress of the cable material is 200 N/mm^2.

iii) The length of the cable. (10 Marks)

6 Determine all the reaction components and, draw shear and moment diagrams for the beam shown in Fig.Q6.

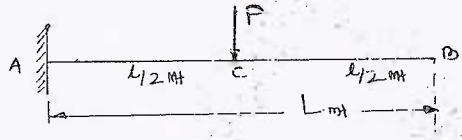

Fig.Q6 (20 Marks)

7 Analyze the beam shown in Fig.Q7 and draw shear force and bending moment diagrams by using Clapeyron's theorem.

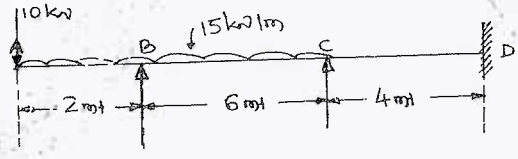

Fig.Q7 (20 Marks)

8 A two hinged parabolic arch of span 40 mt and carries a udl of 30 kN/mt over left half portion and a concentrated load of 120 kN at 5 mt from right hand support. Find the horizontal thrust and normal thrust and radial sheath at 10 mt from right hand support. [Refer Fig.Q8]

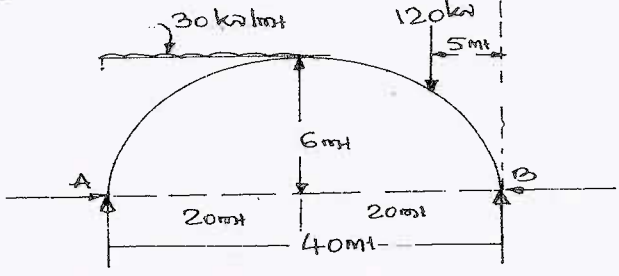

Fig.Q8 (20 Marks)

* * * * *

CBCS Scheme

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

15CV33

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018

Fluid Mechanics

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define the terms 'continuum' and 'rheology'. **(04 Marks)**

b. Explain why an inflated balloon will rise to a definite height once it starts to rise, whereas a submarine will always sink to the bottom of ocean once it starts to sink, if no changes are made. How then can a submarine stay at a definite level under the water? **(04 Marks)**

c. Prove that the relative density of mixture of 'n' fluids is greater when equal volumes are taken than when equal weights are taken, assuming no changes in volume as the result of mixing. **(08 Marks)**

OR

2 a. Why does the viscosity of a liquid decrease with increase in temperature whereas it increases with increase in temperature in the case of gas? **(04 Marks)**

b. Find the increase in the pressure required to reduce the volume of water by 0.8 percent. Given $K = 2.075 \times 10^9\ Nm^{-2}$. **(04 Marks)**

c. Determine the pressure difference $(p_A - p_B)$ in Fig.Q2(c).

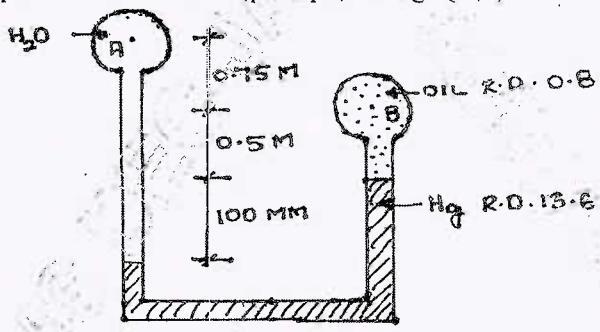

Fig.Q2(c) **(08 Marks)**

Module-2

3 a. Prove that for a plate kept vertical in a liquid will have its centre of pressure below its centroid. **(07 Marks)**

b. In each of the following cases state, giving reasons whether the flow is steady, unsteady, uniform or non uniform.

i) $U = 10xt + 15x^2$

ii) $U = 20$

iii) Flow in pipe bend with constant discharge.

iv) Flow in a converging pipe in which discharge is gradually increased.

v) Flow in a constant diameter pipe in which discharge is continuously increasing. **(05 Marks)**

c. If the equation of stream lines for a given fluid flow problem is $x^2 - y^2 =$ constant, determine the magnitude and direction of velocity vector at (3, 4). **(04 Marks)**

OR

4 a. A 60° radial gate of 5m radius and 3m length stores water upto its top as shown in Fig.Q4(a). Determine the components of total force and its point of application.

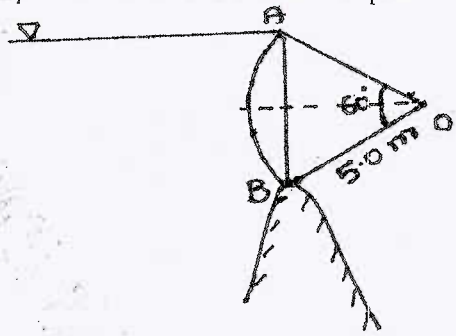

Fig.Q4(a) **(06 Marks)**

b. Show that the stream lines and velocity potential lines cross each other orthogonally. **(05 Marks)**

c. Stating the assumptions made, derive the Euler's equation. Hence obtain Bernoulli's equation from it. **(05 Marks)**

Module-3

5 a. A pitot tube is mounted on an air plane to indicate the speed of the plane relative to the prevailing wind. What differential pressure intensity in kPa will the instrument register when the plane is travelling at a speed of 200 kmph in a wind of 60 kmph blowing against the direction of the plane? $\rho_{air} = 1.2$ kg/m^3. **(05 Marks)**

b. State impulse momentum equation. Derive the expression for force exerted by a flowing fluid on a pipe bend. **(05 Marks)**

c. Derive the equation for the discharge through the venturimeter. **(06 Marks)**

OR

6 a. In a 45° bend a rectangular air duct of 1 m^2 cross sectional area is gradually reduced to 0.5 m^2 area. Find the magnitude and direction of force required to hold the duct in position if the velocity of flow at 1 m^2 section is 10 ms^{-1}, and pressure is 30 kN/m^2. Take the specific weight of air as 0.0116 kN/m^3. **(06 Marks)**

b. A pitot static tube is inserted in a 30 cm diameter pipe. The static pressure in the pipe is 12.5 cm of mercury (vacuum). The stagnation pressure at the centre of the pipe is 1.15 N/cm^2 (gauge). Calculate the rate of flow of water through the pipe. The mean velocity of flow is 0.875 times the central velocity. Take $C_V = 0.985$. **(06 Marks)**

c. Define the terms 'Orifice' and 'Mouthpiece'. Give the detailed classification of mouth pieces with neat sketches. **(04 Marks)**

Module-4

7 a. Water flows over a rectangular weir in wide at a depth of 15 cm and afterwards passes through a triangular right angled weir. Taking C_d for rectangular weir 0.62 and for triangular 0.59. Find the depth over the triangular weir. **(06 Marks)**

b. Explain cipolletti notch. What is the advantage of cipolletti notch over trapezoidal notch? Give the equation of discharge over a cipolletti notch. **(10 Marks)**

OR

8 a. A rectangular notch 40 cm long is used for measuring a discharge of 30 LPS. An error of 1.5 mm was made while measuring the head over the notch. Calculate the percent error in the discharge. Take $C_d = 0.6$. **(06 Marks)**

b. Mention the advantages of triangular notch over rectangular notch. **(04 Marks)**

c. Define hydraulic coefficients and to discuss how to determine the hydraulic coefficients experimentally. **(06 Marks)**

Module-5

9 a. Define the terms 'compound pipe' and 'equivalent pipe'. Derive the expression for diameter of equivalent pipe. **(06 Marks)**

b. Water flowing through a rigid pipe of diameter 500 mm with 1.5 m/s is suddenly brought to rest. Find the instantaneous pressure rise if K_{water} = 2 GPa. **(04 Marks)**

c. A compound piping system consists of 1800 m of 0.5 m, 1200 m of 0.4 m and 600 m of 0.3 m new cast iron pipes connected in series. Convert the system to: i) Equivalent length of 0.4 m pipe; ii) Equivalent size pipe 3600 m long. **(06 Marks)**

OR

10 a. Derive an expression for instantaneous rise in pressure in an elastic pipe due to sudden closure of valve. **(08 Marks)**

b. Water is to be supplied to the inhabitants of a college campus, through a supply main. The following data is given:
Distance of the reservoir from the campus = 3000 m
Number of inhabitants = 4000
Consumption of water per day of each inhabitants = 180 liters
Loss of head due to friction = 18 m
Coefficient of friction for the pipe, f = 0.007
If one half of the daily supply is pumped in 8 hours, determine the size of the supply main. **(08 Marks)**

* * * * *

CBCS Scheme

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

15CV34

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
Basic Surveying

Time: 3 hrs. Max. Marks: 80

Note: *Answer FIVE full questions, choosing one full question from each module.*

Module-1

1 a. Define surveying. Explain briefly principles of surveying. **(07 Marks)**

b. What is 'Ranging'? Explain indirect or reciprocal ranging with neat sketch. **(06 Marks)**

c. A steel tape 20 m long standardized at 55°F with a pull of 10 kg was used for measuring a baseline. Find the correction per tape length, if the temperature at the time of measurement was 80°F and pull exerted was 16 kg. Weight of 1 cubic cm of steel is 7.86 gms. Weight of tape = 0.8 kg and $E = 2.109 \times 10^6$ kg/cm^2 coefficient of expansion of tape per 1°F = 6.2×10^{-6}. **(03 Marks)**

OR

2 a. Differentiate between plane and geodetic surveying. **(06 Marks)**

b. In passing an obstacle in form of a pond, stations A and D, on the main line were taken an opposite sides of the pond. On the left of AD, a line AB 200 m long was laid down and a second line AC 250 m long was ranged on AD, the points B, D and C being in the same straight line. BD and DC were then chained and found to be 125 m and 150 m respectively. Find length of AD. **(06 Marks)**

c. Distinguish between accuracy and precision in surveying. **(04 Marks)**

Module-2

3 a. What are the temporary adjustments to be carried out for theodolite? **(08 Marks)**

b. Following bearings were observed with a compass. Calculate the interior angles. **(05 Marks)**

Line	Fore Bearing
AB	60°30'
BC	122°0'
CD	46°0'
DE	205°30'
EA	300°0'

c. Define the terms: (i) True bearing. (ii) Magnetic bearing. (iii) Magnetic declination. **(03 Marks)**

OR

4 a. Explain step by step procedure of measuring horizontal angle by Repetition method. **(08 Marks)**

b. The following are the bearings of closed traverse ABCDA. At what station do you suspect the local attraction? Find the corrected bearings of the sides. If magnitude of magnetic declination at the place is 2°20' W, compute the true bearings of the lines. **(08 Marks)**

Line	Fore bearing	Back bearing
AB	124°30'	304°30'
BC	68°15'	246°0'
CD	310°30'	135°15'
DA	200°15'	17°45'

Module-3

5 a. Discuss transit method and Bawditch method. **(06 Marks)**

b. The following data is available for a closed traverse ABCDEA. Check for angular error and correct it if necessary. Determine closing error and adjust the traverse using "Transit rule". Taking coordinates of station 'A' as (400, 400), compute coordinates of all stations. **(10 Marks)**

Line	Length (m)	Bearing
AB	130	92°
BC	158	174°
CD	145	220°
DE	308	279°
EA	337	48°

OR

6 a. The elevation of point 'P' is to be determined by observations from two adjacent stations of a tacheometric survey. The staff was held vertically upon the point, and the instrument is fitted within an anallactic lens, the constant of the instrument being 100. Compute the elevation of the point 'P' from the following data, taking both observations as equally trustworthy. Also calculate the distance of A and B from 'P'. **(10 Marks)**

Inst. station	Height of axis	Staff point	Vertical angle	Staff readings	Elevation of station
A	1.42	P	$+2^{0}24'$	1.230, 2.055, 2.880	77.750 m
B	1.40	P	$-3^{0}36'$	0.785, 1.800, 2.815	97.135 m

b. Derive distance and elevation formulae for stadia tacheometry, when the staff held normal to line of sight and both for an angle of elevation and angle of depression. **(06 Marks)**

Module-4

7 a. Define the following terms:
(i) Bench mark (ii) Parallax (iii) Line of collimation (iv) Back sight
(v) MSL (vi) Reduced level **(06 Marks)**

b. The following staff readings were observed successively with a level, the instrument having been moved after third, sixth and eighth readings. Enter the readings and calculate RL of points by Rise and Fall method if first readings was taken with a staff held on BM = 432.384 m
2.228 m, 1.606, 0.988, 2.090, 2.864, 1.262, 0.602, 1.982, 1.044, 2.684 m. **(10 Marks)**

OR

8 a. What is sensitiveness of bubble tube? Explain any one method of determining sensitivity. **(06 Marks)**

b. In order to determine the elevation of top 'Q' of a signal on a hill, observations were made from two stations 'P' and 'R'. The stations P, R and Q were on the same plane. If angles of elevation of the top 'Q' of signal measured at 'P' and 'R' were 25°35' and 15°05' respectively. Determine the elevation of the foot of the signal if height of signal above its base was 4 m. The staff readings upon the B.M (RL 105.42) were respectively 2.755 and 3.855 m when the instrument was at 'P' and at 'R'. The distance between 'P' and 'R' was 120 m. **(10 Marks)**

Module-5

9 a. What are the characteristics of contours? **(08 Marks)**

b. The following perpendicular offsets were taken from a chain line to a hedge –

Chainage (m)	0	15	30	45	60	70	80	100	120	140
Offsets (m)	7.6	8.5	10.7	12.8	10.6	9.5	8.3	7.9	6.4	4.4

Calculate the area between survey line, the hedge and end offsets by,

(i) Trapezoidal rule.

(ii) Simpson's rule. **(08 Marks)**

OR

10 a. Discuss the methods for determining areas and volumes. **(06 Marks)**

b. A railway embankment 400 m long is 12 m wide at the formation level and has side slope of 2 to 1. The ground levels at every 100 m along the centre line are as under –

Distance	0	100	200	300	400
R.L	204.8	206.2	207.5	207.2	208.3

The formation level at zero chainage is 207.00 and the embankment has a rising gradient of 1 in 100. The ground is level across the centre line. Calculate the volume of earth work. **(10 Marks)**

* * * * *

CBCS Scheme

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

15CV/CT35

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
Engineering Geology

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing one full question from each module.*

Module-1

1 a. What is Engineering Geology? Discuss its role in Civil Engineering Projects. **(08 Marks)**

b. With a neat sketch, explain the structure and composition of the earth. **(08 Marks)**

OR

2 a. Explain briefly i) Rock forming mineral ii) Economic mineral. **(04 Marks)**

b. Name the physical properties which are helpful to identify the minerals. Explain Luster and Fracture of a mineral, with suitable examples. **(06 Marks)**

c. Write the chemical composition , cleavages and uses of the following minerals :
i) Calcite ii) Quartz iii) Gypsum. **(06 Marks)**

Module-2

3 a. What are Igneous Rocks? Explain the classification of Igneous Rocks with suitable examples. Mention the Engineering considerations of Igneous Rocks. **(08 Marks)**

b. What is Rock Quality Designation (RQD)? How is RQD used for the rock mass classification? **(08 Marks)**

OR

4 a. With a neat sketch, explain the developments of folds , joints, faults and unconformities in Rocks. **(08 Marks)**

b. Mention the engineering considerations of folds, joints, faults and unconformities. **(08 Marks)**

Module-3

5 a. Discuss briefly the Geomorphological aspects in the selection of site for Dam construction. **(08 Marks)**

b. What are Tunnels? Explain the important Geological factors taken into account while Tunneling. **(08 Marks)**

OR

6 a. Explain briefly : i) Weathering of Rocks ii) Tectonic cause of Earth quake. **(08 Marks)**

b. What are the causes of Landslides? How can Landslides be prevented. **(08 Marks)**

Module-4

7 a. Briefly explain Hydrological cycle. **(04 Marks)**

b. Define Aquifers. Explain with neat sketches, various types of aquifers. **(08 Marks)**

c. Explain in brief zone of aeration and zone of saturation. **(04 Marks)**

OR

8 a. Explain in detail Ground water exploration by Electrical Resistivity method. **(10 Marks)**

b. Give an account of Artificial Recharge of ground water by various methods. **(06 Marks)**

Module-5

9 a. Discuss the application of Remote sensing and GIS Technique in Civil Engineering Projects. **(12 Marks)**

b. Write a note on Impact of Mining on Environment. **(04 Marks)**

OR

10 Write a note on :

a. Natural Disaster and Mitigation.

b. Landsat Imagery.

c. Impact of Reservoirs on Environment.

d. Uses of Topographic maps. **(16 Marks)**

* * * * *

CBCS Scheme

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

15CV36

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
Building Materials and Construction

Time: 3 hrs. Max. Marks: 80

Note: *Answer FIVE full questions, choosing one full question from each module.*

Module-1

1 a. Write the requirements of good building stones. **(04 Marks)**
b. Briefly explain the causes of deterioration of stone work. **(06 Marks)**
c. Briefly explain classification of bricks with respect to properties. **(06 Marks)**

OR

2 a. Write a note on classification of Mortar. **(04 Marks)**
b. Briefly explain the importance of size, shape and texture on coarse aggregates. **(06 Marks)**
c. Explain Flakiness Index and Elongation Index test on coarse aggregates. **(06 Marks)**

Module-2

3 a. Write the functions and requirements of good foundation. **(05 Marks)**
b. Explain with the help of sketches : i) Combined footing ii) Strap footing. **(06 Marks)**
c. Explain with sketch, any one type of Pile foundation. **(05 Marks)**

OR

4 a. With the help of sketches, write the features of English bond and Flemish bond. **(06 Marks)**
b. Briefly explain classification of stone masonry. **(06 Marks)**
c. Define a Cavity wall. Write the advantages of cavity wall. **(04 Marks)**

Module-3

5 a. Briefly explain classification of Lintels. **(06 Marks)**
b. With sketches, explain classification of Arches based on number of centers. **(06 Marks)**
c. What are the factors that affect the choice of a flooring materials? **(04 Marks)**

OR

6 a. Explain the procedure of laying Terrazo flooring. **(04 Marks)**
b. Write the requirements of good roof. **(04 Marks)**
c. With the help of neat sketch, explain King Post Truss. **(08 Marks)**

Module-4

7 a. With the help of neat sketch, explain :
i) Paneled Door ii) Collapsible Door. **(08 Marks)**
b. With the help of neat sketches, explain :
i) Panelled and Glazed window ii) Bay window. **(08 Marks)**

OR

8 a. With the help of neat sketches, explain types of stairs. **(08 Marks)**
b. Write short notes on :
i) Shoring ii) Underpinning. **(08 Marks)**

Module-5

9	a.	Write the purposes of Plastering.	(05 Marks)
	b.	Explain various types of Plaster finishes.	(06 Marks)
	c.	Explain Stucco plastering.	(05 Marks)

OR

10	a.	Explain the constituents of Paint.	(06 Marks)
	b.	Explain the procedure of pointing to plastered surface.	(05 Marks)
	c.	Explain different methods of damp proofing.	(05 Marks)

* * * * *

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

10CV/EV33

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018

Strength of Materials

Time: 3 hrs. Max. Marks:100

Note: *Answer any FIVE full questions, selecting at least TWO questions from each part.*

PART – A

1 a. Define: (i) Yielding. (ii) Hooke's law. **(04 Marks)**

b. Derive an expression for the deformation of tapering plate of uniform thickness subjected to axial force F. **(06 Marks)**

c. A brass tube 100 mm internal diameter and 10 mm thick is enclosed in a steel tube 120 mm internal diameter and 10 mm. Both the tubes are rigidly fixed to each other and carries an axial load of 3000 kN. The tubes are of same length of 3m. Determine the load carried, stress induced in each material. Also determine the amount by which it shortens. Given $E_S = 200\ kN/mm^2$, $E_B = 100\ kN/mm^2$. **(10 Marks)**

2 a. Define: (i) Lateral strain. (ii) Bulk modulus. **(04 Marks)**

b. Derive the relationship between Young's modulus and shear modulus. **(06 Marks)**

c. A steel bar 25 mm in diameter is enclosed in a brass tube 25 mm internal diameter and 50 mm external diameter. Both the bars are of length 1m and rigidly fixed to each other. The composite bar is subjected to rise in temperature of 60°C. Determine the stresses due to temperature change.

If in addition to temperature change the bar is subjected to a pull of 60 kN, determine resultant stresses $E_B = 100\ kN/mm^2$, $E_s = 200\ kN/mm^2$, $\alpha_s = 12 \times 10^{-6}/°C$, $\alpha_B = 18 \times 10^{-6}/°C$. **(10 Marks)**

3 a. Define:

i) Principal stresses.

ii) Critical planes.

iii) Principal planes. **(06 Marks)**

b. The stresses on a strained element are as shown in Fig.Q3(b). Determine:

i) Stresses when the element is rotated through an angle of 30° as shown.

ii) Principal plane and principal stresses.

Sketch the planes.

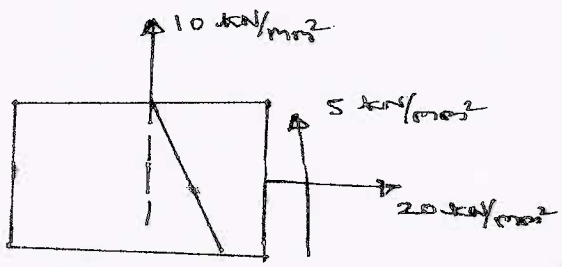

Fig.Q3(b) **(14 Marks)**

4 a. Define:

i) Hogging bending moment

ii) Sagging bending moment

iii) Point of contraflexure. **(06 Marks)**

b. Draw SFD and BMD for the beam shown in Fig.Q4(b) showing salient features.

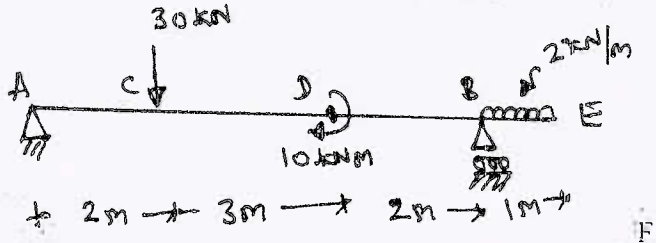

Fig.Q4(b) **(14 Marks)**

PART – B

5 a. Prove that maximum shear stress in a rectangular section of width b and depth d is equal to 1.5 times of its average shear stress. **(05 Marks)**

b. State the assumptions made in the theory of pure bending. **(05 Marks)**

c. A rolled I section of size 75 mm × 50 mm is used as a beam with an effective span of 3m. The flanges are 5 mm thick and web 3.7 mm thick. Calculate the uniformly distributed load the beam can carry if the maximum shear stress is 40 N/mm^2. **(10 Marks)**

6 a. Derive an expression for slope at support and maximum deflection for a simply supported beam subjected to point load at midspan. **(08 Marks)**

b. Distinguish between nature of slope and deflection of a simply supported beam and a cantilever beam. **(04 Marks)**

c. A cantilever beam of uniform cross section carries UDL of 30 kN/m over entire span of 3m. Given I = 5×10^8 mm^4 and deflection at free end 3.04 mm. determine Young's modulus of elasticity of beam material. **(08 Marks)**

7 a. Prove that a hollow shaft is stronger and stiffer than the solid shaft of same material, length and weight. **(08 Marks)**

b. Determine the diameter of the solid shaft transmitting 120 kW at 120 rpm if the permissible shear stress is 80 N/mm^2. What would be the diameter of a hollow shaft of same length having external diameter twice the internal diameter to transmit same power at same rate of revolution. What is the percentage saving in weight by changing over to hollow shaft? **(12 Marks)**

8 a. State the assumptions made in Euler's theory for long columns. Also state limitations of Euler's formula. **(06 Marks)**

b. Derive an expression for Euler's buckling load with both ends hinged. **(06 Marks)**

c. Calculate the safe compressive load on a hollow cast iron column one end rigidly fixed and other end hinged of 150 mm external diameter and 110 mm internal diameter. The column is 10m in length. Use Euler's formula with a factor of safety of 5 and E = 100 kN/mm^2. **(08 Marks)**

* * * * *

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

10CV35

Third Semester B.E. Degree Examination, Dec.2017/Jan.2018
Fluid Mechanics

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. How are fluids classified based on property of viscosity? Explain with examples for each types. **(10 Marks)**

b. A liquid has a specific gravity of 0.72. Find its density and specific weight. Find also the weight per liter of liquid. **(05 Marks)**

c. The left and right limbs of capillary U-tube are 1.25 mm and 2.50 mm in diameter. The tube contains a liquid of surface tension 0.05 N/m. Assuming the contact angle to be zero. find the specific weight and density of the liquid if the difference in the liquid levels in the two limbs is 10 mm. **(05 Marks)**

2 a. Explain the working principles of electronic pressure gauge. List the types of electronic pressure gauge. Explain any one type. **(08 Marks)**

b. With a neat sketch, of "U" tube manometer, explain the principle of writing manometric equation. **(04 Marks)**

c. The right and left limb of a "U" tube is of diameter 20 mm and 5 mm respectively. The left limb contains liquid of sp.gravity 0.9 while left limb consists of liquid of sp.gravity 1.35. The positions of the liquid level in the two limbs are shown in Fig. Q2 (c). What pressure should be applied on surface of the heavier liquid in order to rise the level in the limb containing lighter liquid by 10 mm. **(08 Marks)**

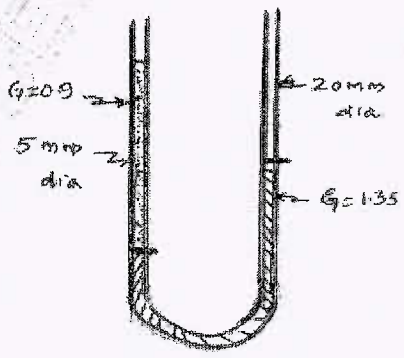

Fig. Q2 (c)

3 a. With Usual notation, derive expression for the force exerted on a submerged inclined plane surface by the static fluid and locate the position of centre of pressure. Also prove that the total pressure exerted by a static liquid on an inclined plane submerged surface is the same as the force exerted on a vertical plane surface as long as the depth of centre of gravity of the surface is unaltered. **(10 Marks)**

b. A square pipe whose two edges parallel to the ground surface is of edge dimension 1.5 m. It carries oil of specific gravity 0.9 under pressure (measured at the centre) 250 kN/m^2. Find the force exerted by the oil on the gate valve at the end of the pipe and also find the position of the centre of pressure. **(10 Marks)**

4 a. With new sketches, define and distinguish between streamline, path line and streak line. (06 Marks)

b. Derive with usual notation three dimensional continuity equation in Cartesian co-ordinates. (08 Marks)

c. The velocity components of a two dimensional incompressible flow are $u = x - 4y$ and $v = -y - 4x$. The flow is continuous. Find the velocity potential function and stream function. (06 Marks)

PART – B

5 a. State the assumptions made in the Bernoulli's equation. Derive the Bernoulli's equation from Euler's equation with usual form. (08 Marks)

b. What is kinetic energy correction factor, derive the expression for kinetic energy correction factor. How is it incorporated in Bernoulli's equation. (06 Marks)

c. A 400 m long pipe tapers from 1.20 m diameter at high end and 0.60 m diameter at the low end, the slope of the pipe being 1 in 100. The pipe conveys a discharge of 1025 cum/s. If the pressure at high end is 75 KPa, find the pressure at the low end, ignore losses. (06 Marks)

6 a. Derive expression for pressure rise due to instantaneous closure of valve for rigid and elastic pipes. (10 Marks)

b. A pipe line 2.50 km long 180 mm diameter conveys a discharge of 0.015 m^3/s. From high level tank to a low level tank. If it is planned to increase the discharge to the low level tank by 30% by attaching an additional pipe in parallel to the latter half length of the pipe, find the diameter of this pipe. Take $f = 0.0075$. (10 Marks)

7 a. How Floats and Currents meter are used to find the velocity in stream? Explain. (08 Marks)

b. A Pitot tube records a reading of 7.85 kPa as the stagnation pressure, when it is held at the centre of a pipe of 250 mm diameter conveying water. The static pressure in the pipe is 40 mm of mercury (vacuum). Calculate the discharge in the pipe assuming that the mean velocity of flow is 0.8 times the velocity at the centre. Take co-efficient of Pitot tube as 0.98. (06 Marks)

c. Following velocities are recorded in a stream with a current meter,

Depth above bed (m)	0	1	2	3	4
Velocity (m/s)	0	0.5	0.7	0.8	0.8

Find the discharge per unit width of stream near the point of measurement depth of flow at the point was 5 m. Use both single point and double point of assessment of discharge. (06 Marks)

8 a. Prove that discharge equation over Cipolletti notch is same as the equation of discharge over a suppressed rectangular notch. (08 Marks)

b. What are the advantages of triangular notch over rectangular notch? (04 Marks)

c. Find the Venturi head for a venturimeter which has its axis vertical. The inlet and throat diameters are 150 mm and 75 mm respectively. The throat is 225 mm above the inlet and petrol of sp. gravity 0.78 flows up through the meter at a rate of 0.029 ms/s. Take $K = 0.96$. Also find the pressure difference between inlet and the throat. (08 Marks)

* * * * *

CBCS Scheme

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

15CV42

Fourth Semester B.E. Degree Examination, June/July 2018
Analysis of Determinate Structures

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. Assume any missing data, if any.

Module-1

1 a. Determine the degree of static indeterminacy for the following structures [Fig.Q.1(a)]. **(08 Marks)**

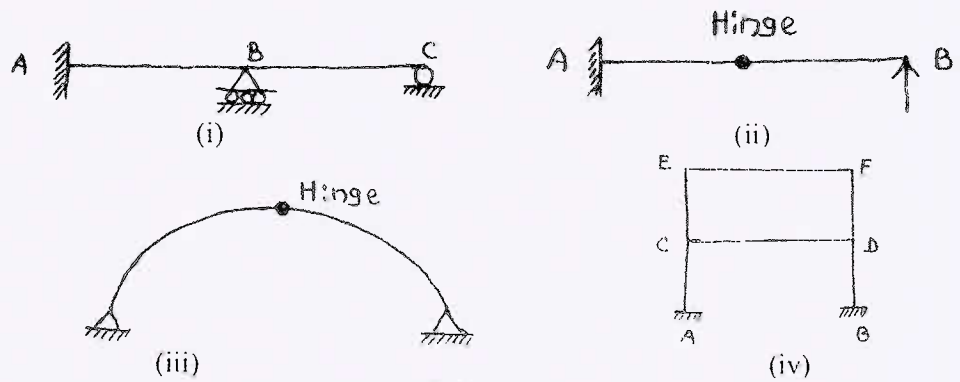

Fig.Q1(a)

b. Determine the forces in all the members of a truss shown in the Fig.Q.1(b) by method of joints and tabulate the results. **(08 Marks)**

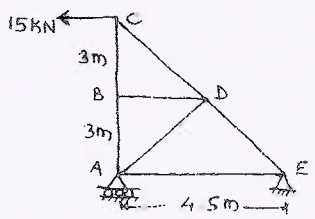

Fig.Q1(b)

OR

2 a. Differentiate between statically determinate and indeterminate structures. **(06 Marks)**

b. State the assumptions made in the analysis of truss. **(02 Marks)**

c. A truss of span 9m is loaded as shown in Fig.Q.2(c). Find the forces in the members marked 1, 2 and 3. **(08 Marks)**

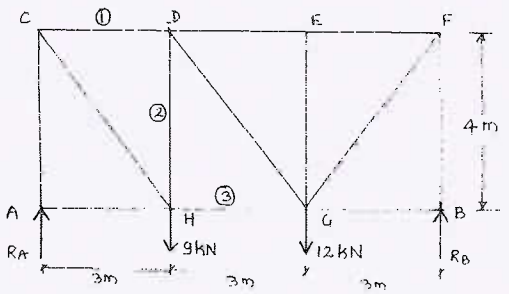

Fig.Q.2(c)

Module-2

3 a. Determine the slope at supports and maximum deflection of a simply supported beam subjected to UDL throughout the span 'L'. Use Double Integration Method. **(08 Marks)**

b. A cantilever of length 2m carries a point load of 20kN at the free end and another load of 20kN at its centre. If $E = 10^5 N/mm^2$ and $I = 10^8 mm^4$ for the cantilever, then determine by moment-area method, the slope and deflection at the free end. Refer Fig.Q.3(b). **(08 Marks)**

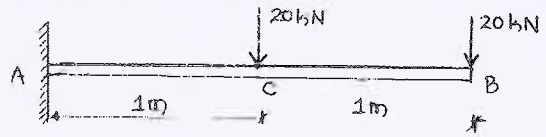

Fig.Q.3(b)

OR

4 a. Compute the deflection under concentrated load for the beam shown in Fig.Q.4(a) by using Macaulay's method. **(08 Marks)**

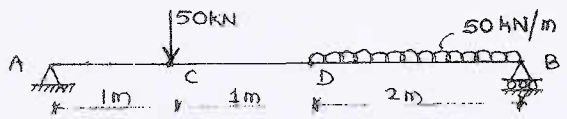

Fig.Q.4(a)

b. A cantilever beam AB of length 2m is carrying a point load 10kN at 'B'. The moment of inertia for the right half of the cantilever is $10^8 mm^4$ where as that for the left half is 2×10^8 mm^4. If $E = 2 \times 10^8$ kN/m^2, find the slope and deflection at the free end of the cantilever. Refer Fig.Q.4(b). Use Conjugate Beam Method. **(08 Marks)**

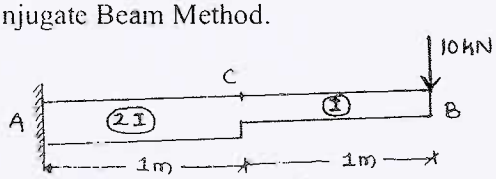

Fig.Q.4(b)

Module-3

5 a. Derive the expression for the strain energy stored in a beam due to flexure. **(06 Marks)**

b. Determine the vertical deflection at 'C' in the frame shown in Fig.Q.5(b). Take $E = 200 \times 10^6$ kN/m^2 and $I = 3 \times 10^7$ mm^4. Use Strain – Energy method. **(10 Marks)**

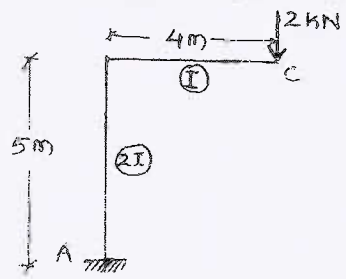

Fig.Q.5(b)

OR

6 a. Find the central deflection of a simply supported beam carrying a point load at mid span shown in Fig.Q.6(a) by using Unit Load method. **(06 Marks)**

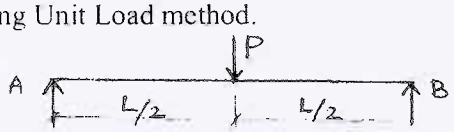

Fig.Q.6(a)

b. The cross-sectional area of the members is as indicated in Fig.Q.6(b). Using Strain – Energy method, find the strain energy stored due to loading. Take E = 200 kN/m^2. **(10 Marks)**

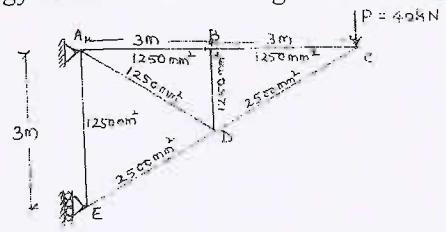

Fig.Q.6(b)

Module-4

7 a. A three hinged parabolic arch hinged at the springing and crown points has a span of 40m and central rise of 8m. It carries a UDL of 20kN/m over the left half of the span together with a concentrated load of 100kN at the right quarter span point. (Centre of right span). Find the reactions at the supports, normal thrust and radial shear at a section 10m from left support. **(08 Marks)**

b. A cable of span 20m and dip 4m carries a UDL of 20kN/m over the whole span. Find: i) Maximum tension in the cable; ii) Minimum tension in the cable; iii) The length of the cable. **(08 Marks)**

OR

8 a. A three hinged parabolic arch of span 20m and central rise of 5m carries a point load of 200kN at 6m from left hand support as shown in Fig.Q.8(a).

i) Find the reaction at the supports A and B.

ii) Draw the bending moment diagram for the arch and indicate the position of maximum bending moment. **(10 Marks)**

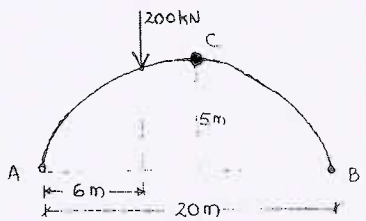

Fig.Q.8(a)

b A cable, supported on piers 80m apart at the same level, has a central dip of 8m. Calculate the maximum tension in the cable, when it is subjected to UDL of 30kN/m throughout the length. Also determine the vertical force on the piers, if the back stay is inclined at 60° to the vertical and cable passes over a pulley. **(06 Marks)**

Module-5

9 a. Define a Influence line diagram. What are the uses of ILD? **(06 Marks)**

b. Determine the reaction R_A by using ILD (influence line diagram) for beam loaded as shown in Fig.Q.9(b). **(10 Marks)**

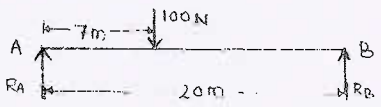

Fig.Q.9(b)

OR

10 a. Draw the influence line diagram for shear force at a section for a simply supported beam subjected to single point load. **(06 Marks)**

b. Draw the ILD for shear force and bending moment for a section 5m from left end of a simply supported beam 20m long. Hence calculate the maximum SF and maximum BM at the section due to an UDL of length 8m and intensity 10kN/m. **(10 Marks)**

* * * * *

CBCS Scheme

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

15CV43

Fourth Semester B.E. Degree Examination, June/July 2018
Applied Hydraulics

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. What is meant by Dimensional Homogeneity? Give example. **(06 Marks)**

b. The Frictional Torque (T) of a Disc of diameter (D) rotating at a speed (N) in a fluid of viscosity (μ) and density (ρ) in a turbulent flow using dimensional analysis prove $T = D^5 N^2 \rho \, \phi\left[\frac{\mu}{D^2 N \rho}\right]$. **(10 Marks)**

OR

2 a. Explain three types of similarities in model analysis. **(06 Marks)**

b. A ship 300m long moves in a sea water, whose density is 1030 kg/m^3, A 1:100 model of this ship is to be tested in a wind tunnel. The velocity of air in the wind tunnel around the model is 30m/s and the resistance of the model is 60N. Determine the velocity of ship in sea water and also the resistance of the ship in sea water. The density of air is 1.24 kg/m^3. Take the kinematic viscosity of sea water and air as 0.012 stokes and 0.018 stokes respectively. **(10 Marks)**

Module-2

3 a. Explain classification of flow in open channel. **(06 Marks)**

b. Derive conditions for most economical rectangular channel. **(04 Marks)**

c. A trapezoidal channel has side slopes of 1H:2V and the slope of bed is 1 in 1500. The area of the section is 40m^2. Find the most economical dimensions of channel. Also determine the discharge of the channel. Take C = 50. **(06 Marks)**

OR

4 a. Explain with sketch the specific energy curve. **(06 Marks)**

b. The discharge of water through a rectangular channel of width 8m is 15 m^3/s, when depth of flow of water is 1.2m. Calculate:

i) Specific energy of flowing water.

ii) Critical depth and critical velocity.

iii) Value of minimum specific energy. **(10 Marks)**

Module-3

5 a. Derive equation of a hydraulic jump in a horizontal rectangular channel. **(10 Marks)**

b. A hydraulic jump forms at the downstream end of a spillway carrying 17.93 m^3/s discharge. If the depth before jump is 0.8m, determine the depth after jump and energy loss. **(06 Marks)**

OR

6 a. Explain following slope profiles: i) Critical slope ii) Mild slope iii) Steep slope also draw profiles of M1, M2 and M3. **(06 Marks)**

b. Derive expression for the length of backwater curve. **(10 Marks)**

Module-4

7 a. Derive expression for force and work done on a curved plate, which is moving in the direction of jet. **(06 Marks)**

b. A jet of water having a velocity of 40 m/s strikes a curved vane which is moving with a velocity of 20 m/s. The jet makes an angle of 30° with the direction of motion of vane at inlet and leaves at angle of 90° to the direction of motion of vane at outlet. Draw the velocity triangles at inlet and outlet and determine the vane angles at inlet and outlet so that the water enters and leaves the vanes without shock. **(10 Marks)**

OR

8 a. Explain classification of Turbines. **(06 Marks)**

b. The Penstock supplies water from a reservoir to the pelton wheel with a gross head of 500m. One-third of gross head is lost in friction in the penstock. The rate of flow of water through the nozzle fitted at the end of penstock is 2 m^3/s. The angle of deflection of the jet is 165°. Determine the power given by the water to the runner and also hydraulic efficiency take speed ratio as 0.45 and coefficient of velocity as 1. **(10 Marks)**

Module-5

9 a. Explain with a neat sketch the working of a inward flow reaction turbine (Francis turbine). **(06 Marks)**

b. A Kaplan turbine runner is to be designed to develop 9100 kW. The net available head is 5.6m. If the speed ratio is 2.09, flow ratio is 0.68, overall efficiency is 86% and the diameter of the boss is 1/3 × diameter of the runner. Find the diameter of the runner, its speed and specific speed of the turbine. **(10 Marks)**

OR

10 a. Explain components and working of a centrifugal pump. **(06 Marks)**

b. A centrifugal pump having outer diameter = 2 times the inner diameter and running at 1000 RPM works against a total head of 40m. The velocity of flow through the impeller is constant and equal to 2.5 m/s. The vanes are set back at an angle of 40° at outlet. If the outer diameter of the impeller is 500mm and width at outlet is 50mm, determine: i) Vane angle at inlet ii) Work done by impeller on water/sec iii) Manometric efficiency. **(10 Marks)**

* * * * *

CBCS SCHEME

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

15CV/CT44

Fourth Semester B.E. Degree Examination, June/July 2018
Concrete Technology

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing one full question from each module.
2. IS-10262 mix design code is allowed.

Module-1

1 a. Why is concrete the most widely used engineering material? **(04 Marks)**

b. What is an admixture? Name different types of admixtures. **(04 Marks)**

c. Explain the manufacture of cement by dry process, with neat flow chart. **(08 Marks)**

OR

2 a. What are Bogue's compounds? Explain the influence of C_3S in strength gaining process. **(06 Marks)**

b. Name the different tests on cement. **(04 Marks)**

c. Explain briefly the action of accelerator and super plasticizers in the concrete mix, also name any two accelerators used in industry. **(06 Marks)**

Module-2

3 a. What is workability? Explain the factors affecting workability. **(08 Marks)**

b. Explain good and bad practices of making of fresh concrete. **(08 Marks)**

OR

4 a. What is segregation? How to prevent segregation in the concrete mix? **(08 Marks)**

b. Name the tests conducted on workability of concrete. **(04 Marks)**

c. What is curing? Name the methods of curing. **(04 Marks)**

Module-3

5 a. What is strength of concrete? What are the factors affecting the strength of concrete? **(08 Marks)**

b. Define creep, what are the factors affecting the creep of concrete. **(08 Marks)**

OR

6 a. How do you define durability? What are the factors improves the durability of concrete and explain briefly? **(08 Marks)**

b. What is sulphate attack? How to minimize sulphate attack? Also mention its action with equations. **(08 Marks)**

Module-4

7 a. Explain the main factors on which the IS-10262 mix design depends. **(08 Marks)**

b. Draw flow chart of IS code mix design. **(08 Marks)**

OR

8 It is required to design a M_{35} grade concrete mix having a slump of the order of 150-175mm for pile foundations of a structure. Use IS:10262-Indian standard recommended guidelines to estimate preliminary mix proportions. Consider very severe exposure condition during the service life of the structure.

Data:

I) Size of aggregate = 10mm to 20m
II) Specific gravity of aggregate = 2.67
III) Moisture content = 1 percent
IV) Absorption = 0.5 percent
V) Fine aggregate fineness modulus = 2.80 (grading zone I)
VI) Specific gravity = 2.62
VII) Moisture content = 4.1
VIII) Absorption = 1%
IX) Cement OYC grade 53
X) Specific gravity of cement = 3.15.

Other conditions

i) Standard deviation = 2MPa
ii) Air content = 4 to 5%
iii) Maximum allowable w/c ratio = 0.45
iv) Minimum cement content = 340 kg/m^3
v) Density of water = 1000 kg/m^3
vi) Bulk density of

Cement = 1450 kg/m^3
Fire aggregate = 1700 kg/m^3
Coarse aggregate = 1800 kg/m^3. **(16 Marks)**

Module-5

9 a. What is RMC? What are the factors on which the property of RMC depends? **(08 Marks)**

b. What is light weight concrete? Name the aggregates used as light weight aggregate? Explain its property. **(08 Marks)**

OR

10 a. What is self compacting concrete? How it is different from high performance concrete? **(04 Marks)**

b. What are the different types of fibers used in fiber reinforced concrete? **(04 Marks)**

c. Explain maximum and minimum values of workability values measured in L-box. V-tunel and flow test. Explain the above tests briefly. **(08 Marks)**

* * * * *

CBCS SCHEME

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

15CV45

Fourth Semester B.E. Degree Examination, June/July 2018
Basic Geotechnical Engineering

Time: 3 hrs. Max. Marks: 80

Note: 1. ***Answer any FIVE full questions, choosing one full question from each module.***
2. Missing data, if any, may be suitably assumed and clearly stated.

Module-1

1 a. With the help of phase diagrams, explain : i) Dry soil ii) Partially saturated soil iii) Saturated soil. **(06 Marks)**

b. 500g of dry soil was subjected to a sieve analysis. The weight of soil retained on each sieve is as follows :

I.S. Sieve size	Wt. of soil, g	I.S. Sieve size	Wt. of soil. g
4.75mm	10	212 μ	40
2.00mm	165	150 μ	30
1.00mm	100	75 μ	50
425 μ	85		

Plot the grain size distribution curve and determine the following :
i) Percentage of gravel , coarse sand , medium sand , fine sand and silt – clay fraction as per IS : 1498 – 1970.
ii) Effective size iii) Uniformity coefficient iv) Coefficient of curvature
v) The gradation of the soil. **(10 Marks)**

OR

2 a. List the consistency limits and their indices. **(04 Marks)**

b. Explain the Indian standard soil classification system and mention the use of plasticity chart. **(06 Marks)**

c. The weight of soil coated with the thin layer of paraffin wax was 6.90 N. The soil alone weighs 6.83 N. When the sample is immersed in water it displaces 360 ml of water. The specific gravity of soil is 2.73 and that of wax is 0.89. Find the void ratio and degree of saturation, if the moisture content is 17%. **(06 Marks)**

Module-2

3 a. List and explain various soil structures. **(08 Marks)**

b. The following results refers to compaction test as per IS light compaction :

Water content (%)	8.5	12.2	13.75	15.5	18.2	20.2
Wt. of wet soil (kg)	1.8	1.94	2.00	2.05	2.03	1.98

If the specific gravity of soil is 2.7 and volume of compaction mould is 1000 CC. Plot the compaction curve and obtain the maximum dry unit weight and optimum moisture content. **(08 Marks)**

OR

4 a. With the help of neat sketches, explain any two clay minerals. **(08 Marks)**

b. During compaction test on soil having specific gravity of 2.7 gave a maximum dry unit weight of 18kN/m^3 and the water content of 15%. Determine the degree of saturation , air content and percentage air voids at the maximum dry unit weight. What would be the theoretical maximum dry unit weight corresponding to zero air void at the optimum water content? **(08 Marks)**

Module-3

5 a. Explain : i) Superficial velocity ii) Seepage velocity iii) Capillary rise of water in soil. **(06 Marks)**

b. A soil stratum with permeability $K = 5 \times 10^{-7}$ cm/s overlies an impervious stratum. The impervious stratum lies at a depth of 18m below the ground surface. A sheet pile wall penetrates 8m into the permeable soil stratum. Water stands to a height of 9m on upstream side and 1.5m on downstream side above the surface of soil stratum. Sketch the flow net and determine i) Quantity of seepage ii) Seepage pressure at 'P' located 8m below the surface of soil stratum and 4m away from the sheet pile wall on its upstream side. **(10 Marks)**

OR

6 a. What is a Flownet? What are its characteristics and uses? **(06 Marks)**

b. A clay strata 6m thick laying below sand layer 5m thick. The water table is located at a depth of 2m from surface. The sand has porosity of 38% and specific gravity of 2.7. The sand above the water table may be taken as dry. The water content of clay layer if 60% and G = 2.65. Calculate total stress, pore water pressure and effective stress at the middle of clay layer and draw the distribution diagram. **(10 Marks)**

Module-4

7 a. Explain Mass – Spring analogy theory of consolidation of soil. **(06 Marks)**

b. A saturated soil stratum 5m thick lies above an impervious stratum and below a pervious stratum. It has a compression index of 0.25 and coefficient of permeability 3.2×10^{-4} cm/s void ratio at stress 150kN/m^2 is 1.9. Compute i) Change in void ratio due to increase of stress to 200kN/m^2 ii) Settlement due to increased load iii) Time required for 50% consolidation. **(10 Marks)**

OR

8 a. With the help of neat sketch, explain determination of pre-consolidation pressure by Casagrende's method. **(06 Marks)**

b. Differentiate between Normally consolidated and Over consolidated soils. **(04 Marks)**

c. A 3m thick layer of saturated clay in the field under a surcharge loading with achieve 90% consolidation in 75 days in double drainage conditions. Find the co-efficient of consolidation of the clay. **(06 Marks)**

Module-5

9 a. Explain Mohr – Coulomb failure theory of soil. **(06 Marks)**

b. Compute the shear strength of soil along a horizontal plane at a depth of 5m in a deposite of sand having the following particulars : Angle of internal friction , $\phi = 36^0$; Dry unit weight , $\gamma_d = 17$ kN/m^3 ; Specific gravity , G = 2.7. Assume the ground water table is at a depth of 2.4m below the ground level. Also determine change in shear strength if water level raises to ground level. **(10 Marks)**

OR

10 a. Explain the types of shear test based on different drainage conditions. **(06 Marks)**

b. In a drained triaxial compression test, a saturated sandy sample failed at a deviator stress of 360kN/m^2 and cell pressure of 100kN/m^2. Find the effective shear parameters of sand. If another identical sample is tested under a cell pressure of 200kN/m^2 , determine graphically the deviator stress at which the specimen fails. Check the results analytically. **(10 Marks)**

* * * * *

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

10CV/CT42

Fourth Semester B.E. Degree Examination, June/July 2018
Concrete Technology

Time: 3 hrs. Max. Marks:100

Note: *1. Answer FIVE full questions, selecting at least TWO full questions from each part.*
2. IS:10262 code permitted.

PART – A

1 a. Enumerate the importance of chemical composition limits of ordinary portal and cement. **(10 Marks)**

b. Mention the different types of cement. **(05 Marks)**

c. Explain the standard consistency test. **(05 Marks)**

2 a. Explain the importance of size, shape and grading of coarse aggregate. **(10 Marks)**

b. Explain the procedure to determine the crushing test and impact test of aggregate. **(10 Marks)**

3 a. Explain workability. Explain factors affecting workability. **(10 Marks)**

b. Explain the process of manufacture of concrete. **(10 Marks)**

4 a. Explain the chemical admixture plasticizers and air entraining agents. **(10 Marks)**

b. Explain the mineral admixture fly ash and GGBS. **(10 Marks)**

PART – B

5 a. Explain W/C ratio and gel/space ratio. **(10 Marks)**

b. Explain the testing of hardened concrete of compressive strength and split tensile strength. **(10 Marks)**

6 a. Explain elasticity. Explain relation between modulus of elasticity and strength. **(10 Marks)**

b. Explain creep. Factors affecting creep and effect of creep. **(10 Marks)**

7 a. Define durability of concrete. Explain the significance of durability and permeability of concrete. **(10 Marks)**

b. Explain freezing and thawing and carbonation of concrete. **(10 Marks)**

8 Design a concrete mix of M20 grade for the following data as per IS10262-2009.

Data for proportion:

Maximum size of aggregate	- 20mm, crushed angular
Minimum/maximum cement content	- 300/450 kg/m^3
Maximum W/C ratio	- 0.50
Exposure condition	- Moderate
Workability	- 50mm slump
Quality control	- Good

Test data for materials:

i)	Cement	- OPC 43 grade IS 8112
ii)	Specific gravity of cement	- 3.15
iii)	Specific gravity of coarse aggregate	- 2.60
	Water absorption of coarse aggregate	- 0.5%
iv)	Specific gravity of fine aggregate	- 2.65
	Water absorption of fine aggregate	- 1.0%

(20 Marks)

* * * * *

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

10CV43

Fourth Semester B.E. Degree Examination, June/July 2018
Structural Analysis–I

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. Define linear and non-linear structures, static and kinematic indeterminacies. **(04 Marks)**

b. Determine static and kinematic indeterminacies of structures shown in Fig.Q1(b). **(10 Marks)**

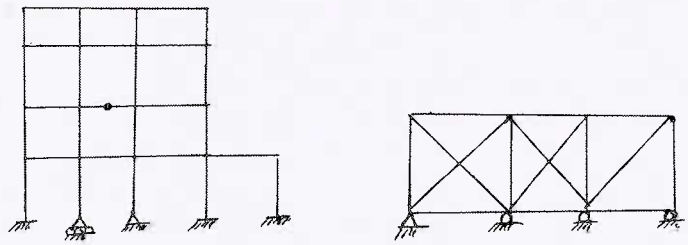

Fig.Q1(b)

c. Obtain an expression for strain energy stored in flexure for a cantilever with a concentrated load at the free end, with usual notations. **(06 Marks)**

2 a. Using moment–area method obtain maximum slope and maximum deflection for a simply supported beam of span 6m, subjected to a concentrated load of 30 kN, at a distance of 2m from the left support. Take $E = 204 \times 10^6$ kN/m^2 and $I = 50 \times 10^{-6}$m^4. **(10 Marks)**

b. Determine slopes at the supports and deflection at the centre for the beam shown in Fig.Q2(b), using conjugate beam method. **(10 Marks)**

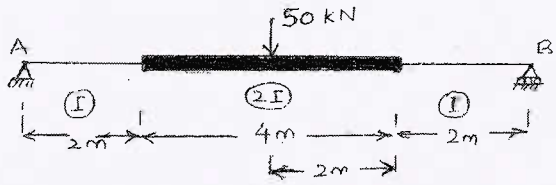

Fig.Q2(b)

3 a. State and prove Betti's law. **(06 Marks)**

b. Obtain vertical and horizontal deflections at the free end of the cantilever frame shown in Fig.Q3(b), using Castigliano's theorem. **(14 Marks)**

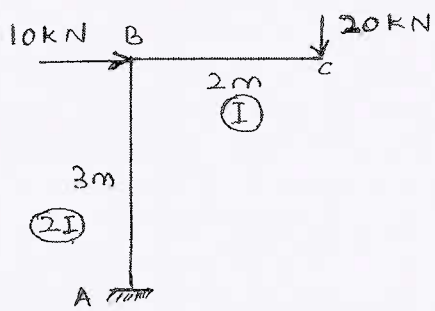

Fig.Q3(b)

4 a. Determine reaction at the propped end of a propped cantilever, loaded with a uniformly distributed load, throughout its span. Use strain–energy method. **(06 Marks)**

b. For the pin-jointed frame shown in Fig.Q4(b), determine vertical deflection under the load, using unit-load method. Cross–sectional area of each member is $500 \times 10^{-6} m^2$ and Young's modulus is 2×10^8 kN/m^2. **(14 Marks)**

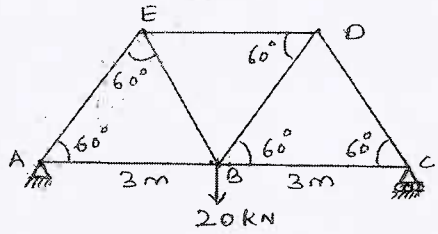

Fig.Q4(b)

PART – B

5 a. A three-hinged parabolic arch, hinged at the crown and at the supports has a span of 24m and a central rise of 4m. It carries a uniformly distributed load of 45kN/m over its left half portion and a concentrated load of 75kN at 6m from the right support. Determine bending moment, normal thrust and radial shear at a section 6m from the left support. **(10 Marks)**

b. A bridge cable is supported from the towers 80m apart and carries a uniformly distributed load of 45kN/m over the entire span. Determine maximum and minimum tensions in the cable, if the maximum sag is 8m. The cable is supported by saddles which are stayed by wires inclined at 30° to the horizontal. Determine forces developed in the towers. **(10 Marks)**

6 a. Analyse the propped cantilever shown in Fig.Q6(a) by consistent deformation method. Draw shear force diagram. **(08 Marks)**

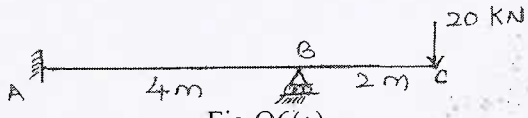

Fig.Q6(a)

b. Analyse the fixed beam shown in Fig.Q6(b) by consistent deformation method. Draw bending moment diagram. **(12 Marks)**

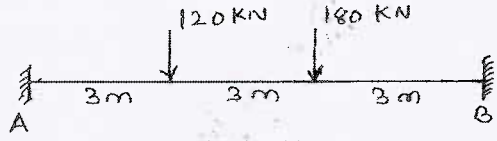

Fig.6Q(b)

7 Using Clapeyron's theorem of three–moments analyze the beam shown in Fig.Q7. Draw bending moment diagram. **(20 Marks)**

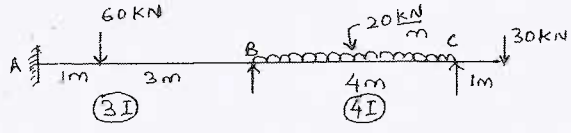

Fig.Q7

8 A two-hinged parabolic arch, with moment of inertia proportional to the secant of the slope of arch axis, span 20m and rise 4m is subjected to a concentrated load of 100kN, placed at 6m from the left support. Calculate the horizontal thrust; bending moment, normal thrust and radial shear at 5m from left support. **(20 Marks)**

* * * * *