CBCS SCHEME

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17CV32

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Strength of Materials

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Show that volumetric strain is equal to algebraic sum of the strains in three mutually perpendicular directions in case of cuboid. **(05 Marks)**

b. Calculate the diameter of steel rod needed to carry a load of 8 kN, if the extension is not to exceed 0.04 percent. Assume $E = 210\ GN/m^2$. **(05 Marks)**

c. A reinforced concrete column 300 mm × 300 mm in size has 4 reinforcement bars of steel 20 mm in diameter. Calculate the safe load, the column can carry if the permissible stress in concrete is 5.2 MN/m², $\frac{E_{steel}}{E_{concrete}} = 18$. **(10 Marks)**

OR

2 a. Derive an expression for change in length in case of a uniformly varying circular cross section whose diameter varies from d_1 to d_2 over a length 'L' subjected to an axial force F. **(06 Marks)**

b. A rod is 2 m long at a temperature of 10°C. Find the expansion of the rod when the temperature is raised to 80°C. If this expansion is prevented, find the stress induced in the material of the rod. Take $E = 1.0 \times 10^5$ MPa and $\alpha = 12 \times 10^{-6}/°C$. **(05 Marks)**

c. A bar of cross section 10mm × 10mm is subjected to an axial pull of 8000 N. The lateral dimension of the bar is found to be changed to 9.9985mm × 9.9985mm. If the modulus of rigidity is $0.8 \times 10^5\ N/mm^2$, determine the Poisson's ratio and modulus of elasticity. **(09 Marks)**

Module-2

3 a. Derive expressions for hoop stress and longitudinal stress in case of thin cylinder. **(08 Marks)**

b. At a point in a strained material the stresses acting are as shown in Fig. Q3 (b). Determine the (i) Principal stresses and their planes (ii) Maximum shear stress and their planes (iii) Normal and shear stresses on the inclined plane AB. **(12 Marks)**

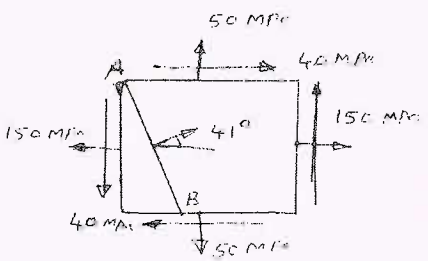

Fig. Q3 (b)

OR

4 a. At a point in a strained material the normal stresses are σ_x and σ_y which are tensile in nature and shear stress acting is τ_{xy}, derive expressions for normal stress and shear stress on an inclined plane making an angle 'θ' with the vertical plane. **(10 Marks)**

b. The inside diameter of thick cylinder is 200 mm. If the internal pressure is 8 N/mm² and maximum permissible stress in cylinder wall is 20 N/mm², what is the minimum thickness required. If the internal pressure is to be increased to 12 N/mm² without exceeding maximum stress, what is the external pressure to be applied? **(10 Marks)**

Module-3

5 a. A cantilever of length 'l' is subjected to a load intensity of w/m at fixed end, uniformly varying to zero at free end. Considering a section 'X' at a distance 'x' from free end, write shear force and bending moment equations and using them draw shear force diagram and bending moment diagram. **(10 Marks)**

b. Draw shear force diagram and bending moment diagram for the Cantilever beam shown in Fig. Q5 (b). **(10 Marks)**

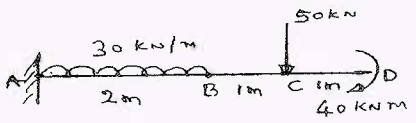

Fig. Q5 (b)

OR

6 a. What is Pare bending? Explain with examples. **(05 Marks)**

b. Draw shear force diagram and bending moment diagram for the beam shown in Fig. Q6 (b). **(15 Marks)**

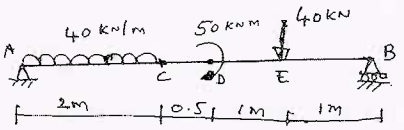

Fig. Q6 (b)

Module-4

7 a. Explain maximum strain energy theory (Beltrami and Haigh). **(05 Marks)**

b. Derive the expression for power transmitted by the shaft. **(05 Marks)**

c. A solid shaft has to transmit 120 kW of power at 160 rpm. If the shear stress is not to exceed 60 MPa and the twist in a length of 3 m must not exceed 1°, find the suitable diameter of the shaft. G = 80 GPa. **(10 Marks)**

OR

8 a. Derive with usual notations the torsion equation,

$$\frac{T}{J} = \frac{\tau_{max}}{R} = \frac{G\theta}{L}$$ **(10 Marks)**

b. The cross section of a bolt is required to resist an axial tension of 15 kN and a transverse shear of 15 kN. Estimate the diameter of the bolt by (i) Maximum principal stress theory and (ii) Maximum shear stress theory. The elastic limit of the material is 300 N/mm^2. Poisson's ratio = 0.25 and factor of safety = 3. **(10 Marks)**

Module-5

9 a. Derive Euler's crippling load when both ends of column are hinged. **(06 Marks)**

b. A horizontal beam of the section shown in Fig. Q9 (b) is 4 m long and is simply supported at the ends. Find the maximum uniformly distributed load it can carry if the compressive and tensile stresses are not to exceed 60 MPa and 30 MPa respectively. **(14 Marks)**

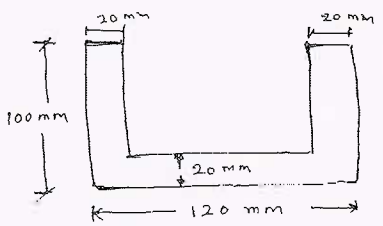

Fig. Q9 (b)

OR

10 a. Define : (i) Neutral axis (ii) Section modulus
(iii) Flexural rigidity (iv) Moment of resistance **(08 Marks)**

b. Compare the crippling loads as found from Euler's and Rankine's formula for a mild steel tube of length 3 m, of internal diameter 5 cm and thickness of metal 0.25 cm. Both ends are pin jointed. E = 2.1×10^2 KN/mm^2. Take $\alpha = \frac{1}{7500}$, $\sigma_c = 300$ N/mm^2. **(12 Marks)**

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CBCS SCHEME

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17CV34

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Basic Surveying

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Define surveying. Enumerate the applications of surveying. **(10 Marks)**

b. Discuss the classification of surveying. **(10 Marks)**

OR

2 a. Explain Indirect method of ranging with a sketch. **(10 Marks)**

b. A big pond obstructs the chain line AB. A line AL was measured on the left of the line AB for circumventing the obstacle. The length of AL was 901 m. Similarly the line AM was measured on the right of the line AB whose length was 1100 m. Points M, B, L are in straight line. Length's of the links BL and BM are 502 m and 548 m respectively. Find the distance AB. **(10 Marks)**

Module-2

3 a. Distinguish between:

i) True meridian and magnetic meridian

ii) Whole Circle bearing and Quandrantal bearing. **(05 Marks)**

b. A closed compass transverse ABCDEA was conducted round a forest and the following bearings were observed with a compass. Calculate the interior angles. Apply check and plot the transverse (not to scale).

Line	AB	BC	CD	DE	EA
Fore bearing	60°30′	122°00′	46°00′	205°30′	300°00′

(10 Marks)

c. The magnetic bearing of a line was found to be N 60°30′ W in 2002, when the declination was 5°10′E. Find its present magnetic bearing, if declination is 3° W. **(05 Marks)**

OR

4 a. Explain briefly the applications of thedolite. **(08 Marks)**

b. Explain the repetition method of measuring the horizontal angle using transit thedolite and errors eliminated by that method. **(12 Marks)**

Module-3

5 a. What is meant by balancing of traverse? Explain the Bowditch method of adjusting the traverse. **(10 Marks)**

b. A tacheometer, fitted with an analectic lens and having the multiplying constant 100, was set up at station C to determine the gradient between two points A and B and the following observations were taken keeping the staff vertical.

Staff @	Vertical angle	Stadia readings
A	+4°20′0″	1.300, 1.610, 1.920
B	0°10′40″	1.100, 1.410, 1.720

If the horizontal angle ACB is 35°20′ determine the gradient between A and B. **(10 Marks)**

OR

6 a. Derive the distance and elevation formulae for stadia techeometry, when the staff is held vertical and the line of sight being inclined upwards and downwards. **(08 Marks)**

b. Describe the closing error in a compass traverse. Explain how the closing error is adjusted by transit rule. **(06 Marks)**

c. The bearings of PQ and QR are 18°36′ and 60°24′ respectively. The coordinated of the ends P and R are:

Point	North coordinate	East Coordinate
P	300.0	400.0
R	1432.8	1257.2

Find the length of PQ and QR. **(06 Marks)**

Module-4

7 a. Explain the effects of curvature and refraction in leveling. **(08 Marks)**

b. The following observations were made on a hill top to ascertain its elevation. The height of the target F was 5m.

Instrument Station	Staff reading on BM	Vertical Angle	Remarks
O_1	2.550	18°6′	RL of
O_2	1.670	28°42′	BM = 345.58

The instrument station were 100 M apart and wave in line with 'F'. **(12 Marks)**

OR

8 a. The following consecutive readings were taken with a dumpy level and 4m leveling staff on a continuously slopping ground at a common interval of 30m: 0.415, 1.025, 2.085, 2.925, 3.620, 0.715, 2.115, 3.090, 0.405, 1.525, 2.005, 3.650. The first point was 185.575 M above MSL. Rule out a page of level book and enter the readings. Calculate the reduced levels of all the points by "Height of instrument method". Also calculate the gradient of line joining first and last points. **(10 Marks)**

b. Derive the expressions for the horizontal distance, vertical distance and the elevation of an elevated object, when the base is inaccessible and instrument stations are not in the same vertical plane with the object. **(10 Marks)**

Module-5

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

Chainage	0	10	20	30	40	50	60	70
Off set	14.2	28.5	35.8	30.6	29.0	27.6	33.5	26.0

Compute the area of by: i) Mid ordinate rule (ii) Trapezoidal rule (iii) Simpson's rule **(12 Marks)**

b. Write short notes on digital planimeter. **(08 Marks)**

OR

10 a. Describe the different characteristics of contours. **(08 Marks)**

b. Explain the interpolation of contours. List the methods of contouring. **(04 Marks)**

c. A road embankment is 30 m wide at the top with side slopes of 2:1. The ground levels at 100 m intervals along a line AB are as under: A 170.30, 169.10, 168.50, 168.10, 166.50 B. The formation level at 'A' is 178.70M with uniform falling ground of 1 in 50 from 'A' to 'B'. Determine the volume of earthwork by prismoidal formula. Assume the ground to be in cross-section. **(08 Marks)**

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CBCS SCHEME

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17CV/CT35

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Engineering Geology

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Describe the role of geology in the Civil Engineering Projects. **(06 Marks)**

b. With neat sketch, explain the different zones of the interior of the EARTH. **(06 Marks)**

c. Define a mineral with examples. Describe the following physical properties of minerals :
i) Lustre ii) Cleavage. **(08 Marks)**

OR

2 Describe how the physical properties are helpful in their identification of minerals in the field with examples. **(20 Marks)**

Module-2

3 a. What are Rocks? Based on their origin, how the rocks have been classified and how are they formed with examples. **(04 Marks)**

b. With the help of neat sketches, describe the forms of igneous rocks. **(08 Marks)**

c. Describe any two rocks their geological properties and add their engineering uses :
i) Granite ii) Sand stone iii) Marble. **(08 Marks)**

OR

4 What are folds? How are they caused? With neat sketch, mention the parts of the fold. Describe the different types of folds with figures. Also add a note on their civil engineering considerations. **(20 Marks)**

Module-3

5 a. What is Weathering? Describe the mechanical and chemical weathering. **(10 Marks)**

b. Give detailed account of geological work done by rivers. **(10 Marks)**

OR

6 a. What is an Earthquake? Describe the tectonic causes of earthquake and write note on the effects of earthquakes. **(10 Marks)**

b. Write note on causes of landslides. **(05 Marks)**

c. Write brief note on coastal land forms. **(05 Marks)**

Module-4

7 a. Define Ground water. Describe the hydrological cycle. Explain the factors influencing the surface runoff and infiltration. **(10 Marks)**

b. Discuss the ground water survey by Electrical Resistivity method, with a circuit diagram. **(10 Marks)**

OR

8 Write notes on :
a. Water table and perched water table.
b. Aquifer and its types.
c. Specific yield and retention.
d. Porosity and Permeability. **(20 Marks)**

Module-5

9 a. What is Remote Sensing? Write its application in Civil Engineering. **(08 Marks)**
b. What is Geographical Information System? Name the different components of Geographical Information System. **(06 Marks)**
c. Write a note on Application of Global Positioning System (GPS) in Civil Engineering. **(06 Marks)**

OR

10 Write a note on :
a. Impact of Mining , Quarring on Environment. **(10 Marks)**
b. Natural disasters and their mitigation. **(10 Marks)**

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CBCS SCHEME

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17CV36

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Building Materials and Construction

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain physical and chemical classification of rocks. **(08 Marks)**

b. List and explain Laboratory tests on bricks. **(06 Marks)**

c. Explain bulking of sand. **(06 Marks)**

OR

2 a. Which are the constituents of good brick earth? Explain. **(06 Marks)**

b. What is Quarrying of stone? Explain methods of Quarrying. **(08 Marks)**

c. Explain the importance of shape, size and texture of coarse aggregates in cement concrete making. **(06 Marks)**

Module-2

3 a. What is foundation? Explain the functions of foundation. **(06 Marks)**

b. Explain strip footing and strap footing with sketches. **(06 Marks)**

c. What are the special features of English bond? Explain with 1½ brick thick wall. **(08 Marks)**

OR

4 a. What is pile foundation? Explain with sketches the classification of pile foundation based on its function. **(06 Marks)**

b. Differentiate between Random rubble masonry and coursed rubble masonry. **(06 Marks)**

c. Draw the plan of 1½ brick thick Flemish bond and explain its salient features. **(08 Marks)**

Module-3

5 a. Explain the following with sketches:
(i) RCC lintel (ii) Stone lintel. **(06 Marks)**

b. Discuss various modes of failure of an arch and what are its remedies? **(06 Marks)**

c. Draw the sketch of king post wooden roof truss (half part) and label its parts. **(08 Marks)**

OR

6 a. Mention the types of sloped roof. Explain any three types of sloped roof with sketches. **(08 Marks)**

b. What are the requirements of good floor? What are the components of ground floor with mosaic flooring? **(06 Marks)**

c. What is an arch? Draw the sketch of elemental arch. **(06 Marks)**

Module-4

7 a. Explain salient features of framed and panelled door with sketch (Double shutter). **(08 Marks)**

b. Differentiate between Bay window and corner window with sketches. **(06 Marks)**

c. What are the requirements of good stair? **(06 Marks)**

OR

8 a. Design a stair-case for a residential building using stair hall 2.5m × 5m. The vertical distance between the floors is 3.6m. Sketch the plan of staircase. **(08 Marks)**

b. What is shoring? Explain Raking shore with a sketch. **(06 Marks)**

c. What are the requirements of locating door and windows? **(06 Marks)**

Module-5

9 a. Discuss the defects in plastering. **(08 Marks)**

b. Name and explain the constituents of oil paint. **(06 Marks)**

c. What are causes of damping in the building and what are its remedies? **(06 Marks)**

OR

10 a. Explain the objects of plastering and types of plaster finishing. **(08 Marks)**

b. Explain the procedure of painting for the following :
(i) New wood work surface
(ii) New plastered surface **(06 Marks)**

c. Differentiate between stucco plastering and lathe plastering. **(06 Marks)**

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CBCS SCHEME

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15CV33

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
Fluid Mechanics

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Calculate the capillary rise in a glass tube of 2.5 mm diameter when immersed vertically in (i) water and (ii) mercury. Take surface tension $\sigma = 0.0725$ N/m for water and $\sigma = 0.50$ N/m for mercury in contact with air. Take specific gravity of mercury as 13.6 and angle of contact = 128°. **(06 Marks)**

b. Prove that the relationship between surface tension and pressure inside a droplet of liquid in excess of outside pressure is given by $p = 4\sigma/d$. **(04 Marks)**

c. A rectangular plate 0.50m × 0.50m dimensions having a weight 500N slides down an inclined plane [Fig.Q1(c)] making 30° angle with the horizontal at a velocity of 1.75 m/sec. If the 2 mm gap between the plate and inclined surface is filled with a lubricating oil, find its viscosity.

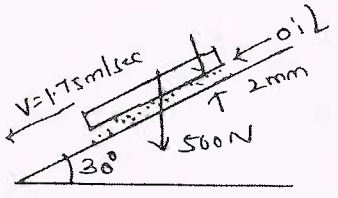

Fig.Q1(c) **(06 Marks)**

OR

2 a. State and prove Pascal's law. **(08 Marks)**

b. Explain with neat sketch: (i) Absolute pressure (ii) Vacuum pressure (iii) Gauge pressure **(05 Marks)**

c. The right limb of a simple U tube manometer containing mercury is open to the atmospheric while the left limb is connected to a pipe in which a fluid of specific gravity 0.9 is flowing. The centre of the pipe is 12 cm below the level of mercury in the right limb. Find the pressure of fluid in the pipe if the difference of mercury level in the two limbs is 20 cm. **(03 Marks)**

Module-2

3 a. Show that centre of pressure lies below the centre of gravity in vertical plane surface submerged in liquid. **(08 Marks)**

b. A gate closing an opening is triangular in section as shown in Fig.Q3(b). The gate is 1m long (in the direction perpendicular to the plane of the paper) and it is made up of concrete weighing 24 kN/m^3. If the gate is hinged at the top and freely supported at one of the bottom ends, find the height of water h on the upstream side when the gate will just be lifted.

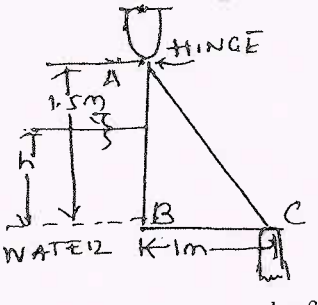

Fig.Q3(b) **(08 Marks)**

OR

4 a. Derive continuity equation in 3 dimensional flow in Cartesian coordinates. **(08 Marks)**

b. The velocity components in a two dimensional flow field for an incompressible fluid are expressed as $U = y^3/3 + 2x - x^2y$, $V = xy^2 - 2y - x^3/3$.

i) Show that these functions represent a possible case of fluid flow.

ii) Obtain an expression for stream functions τ. **(08 Marks)**

Module-3

5 a. State and derive modified Bernoulli's equation. **(08 Marks)**

b. A venture meter is to be fitted in a pipe 0.25 m diameter where the pressure head is 7.6 m of flowing liquid and the maximum flow is 8.1 m^3 per minute. Find the least diameter of the throat to ensure that the pressure head does not become negative. Take $C_d = 0.96$. **(08 Marks)**

OR

6 a. The water is flowing through a pipe having diameter of 20 cm and 10 cm at sections 1 and 2 respectively. The rate of flow through the pipe is 30 litres/sec. The section 1 is 3m above datum and section 2 is 2m above datum. If the pressure at section 1 is 25 N/cm^2, find the intensity of pressure at section 2. **(08 Marks)**

b. A 45° reducing bend is connected in a pipe line, the diameters at the inlet and outlet of the bend being 600 mm and 300 mm respectively. Find the force exerted by water on the bend if the intensity of pressure at inlet to bend is 8.829 N/cm^2 and rate of flow of water is 600 lit/sec. **(08 Marks)**

Module-4

7 a. What are hydraulic coefficients of an orifice? Derive necessary expressions. **(08 Marks)**

b. For a Borda's mouthpiece (running free), show that the coefficient of contraction is 0.5. **(08 Marks)**

OR

8 a. Derive the expression for discharge over a triangular notch. **(08 Marks)**

b. A Cipo letti weir of crest length 60 cm discharge water. The head of water over the weir is 360 mm. Find the discharge over the weir if the channel is 80 cm wide and 50 cm deep. Take $C_d = 0.60$. **(08 Marks)**

Module-5

9 a. Derive Darcy-Weisbach equation for head loss due to friction in a pipe. **(08 Marks)**

b. Three pipes of lengths 800 m, 500 m and 400 m and of diameters 500 mm, 400 mm and 300 mm respectively are connected in series. These pipes are to be replaced by a single pipe of length 1700 m. Find the diameter of the single pipe. **(05 Marks)**

c. Find the loss of head when a pipe of diameter 200 mm is suddenly enlarged to a diameter of 400 mm. the rate of flow of water through the pipe is 250 liters/s. **(03 Marks)**

OR

10 a. Explain water hammer. Derive the expression for water hammer due to sudden closure of valve and pipe is rigid. **(08 Marks)**

b. A main pipe divides into two parallel pipes which again forms one pipe. The length and diameter for the first parallel pipe are 2000 m and 1.0 m respectively, while the length and diameter of 2nd parallel pipe are 2000 m and 0.8 m. Find the rate of flow in each parallel pipe, if total flow in the main is 3.0 m^3/s. The coefficient of friction for each parallel pipe is same and equal to 0.005. **(08 Marks)**

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CBCS SCHEME

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15CV34

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
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. Explain the classification of survey. **(08 Marks)**

b. The distance between two points A and B measured along slope is 504m. Find the horizontal distance between A and B when
i) The angle of slope is 12° ii) The slope is 1 in 4.5 and iii) The difference in elevation of A and B is 65m. **(08 Marks)**

OR

2 a. With neat sketches, explain obstacles in chaining. **(08 Marks)**

b. A and B area two points 200m apart along one bank of a river flowing east to west. The bearings of a tower on the other bank are observed from A and B are 40° and 310° respectively. Find the width of river. **(08 Marks)**

Module-2

3 a. Distinguish between: i) Whole circle bearing and quadrantal bearing ii) Closed traverse and open traverse iii) Dip and Declination. **(08 Marks)**

b. Following are bearing observed in closed traverse. Identify the stations affected by local attraction and determine corrected bearings. **(08 Marks)**

Line	AB	BC	CD	DE	EA
FB	S10°W	S77°E	N5°E	N54°W	S88°W
BB	N10°E	N75°W	S2°W	S50°E	N85°E

OR

4 a. Explain the adjustment of horizontal axis of a transit theodolite by the "Spire Test'. **(08 Marks)**

b. Explain the measurement of a horizontal angle by repetition method. Draw a typical tabular column. **(08 Marks)**

Module-3

5 a. Explain the Bowditch's and Transit methods of adjusting closed traverse. **(08 Marks)**

b. In order to determine the constants of Tacheometer two distances 201m and 400m were accurately measured from the instrument and readings on a stadia rod on the upper and lower wires were taken as follows:

Sl. No.	Distance (m)	Reading (m) (i	
		Lower stadia	Upper stadia
1	201	2.00	4.00
2	400	0.50	4.50

Determine values of the constants and find the distance, when the readings of the wires were 1.5m and 4.5m. The line of sight being horizontal in all cases. **(08 Marks)**

OR

6 a. The following observations are lengths and bearings of the lines of traverse ABCDE, the length and bearing of EA have been omitted. Calculate the length and bearing of the line EA. **(08 Marks)**

Line	AB	BC	CD	DE	EA
Length (m)	204	226	187	192	?
Bearing	87°30′	20°20′	280°0′	210°30′	?

b. Determine the gradient from a point A to a points B from the following observations made with a tachometer fitted with an anallacticlens. The constant of instrument was 100 and staff held vertically. **(08 Marks)**

Instrument st^n	Staff point	Bearing	Vertical angle	Staff reading
P	A	134°	+10° 32′	1.360, 1.915, 2.470
	B	224°	+5° 6′	1.065, 1.885, 2.705

Module-4

7 a. Define the following terms:
i) Back sight ii) Fore sight iii) Bench mark iv) Reduced level. **(08 Marks)**

b. The following consecutive readings were taken with the help of a dumpy level 1.904, 2.653, 3.906, 4.026, 1.964, 1.702, 1.592, 1.261, 2.542, 2.006 and 3.145. The instrument was shifted after fourth and seventh readings. The first reading was taken on the staff held on BM of RL100m. Determine the R.L. of various points by rise and fall method. **(08 Marks)**

OR

8 a. How would you determine the difference in elevation of the instrument station and top of Chimney by single plane method if the base of Chimney is inaccessible, when the instrument axis are at the different level. (any one method). **(08 Marks)**

b. To measure the elevation of a Chimney by double plane method was used. The following observations are mentioned below. Determine the elevation of top of chimney. **(08 Marks)**

Top of Chimney	Station points	Horizontal Angles	Vertical Angles	Staff Readings	Remarks
P	A	$\theta_1 = 62°18'$ (LBAP)	20°12′	2.240m	RL of BM = 400m
	B	$\theta_2 = 72°42'$ (LABP)	21°6′	3.260m	Dist. Between A & B, d = 75m

Module-5

9 a. Explain cross-staff method for calculation of area. **(08 Marks)**

b. A series of offsets were taken from a chain line to a curved boundary line at 15m intervals in the following order. 0.265, 3.80, 3.75, 4.65, 3.60, 4.95, 5.85m. Compute area between a chain line, the curved boundary and end offsets by i) Average ordinate rule ii) Trapezoidal rule iii) Simpson's rule. **(08 Marks)**

OR

10 a. A railway embankment 400m long is 12m wide at formation level and has side slope 2 to 1. The ground level at every 100m along the center line are as under:

Distance (m)	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 center line. Calculate volume of earthwork. **(08 Marks)**

b. Define a contour. List the uses of contour maps. **(08 Marks)**

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CBCS SCHEME

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

15CV36

Third Semester B.E. Degree Examination, Dec.2018/Jan.2019
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 qualities a good building stone should posses when it is used for construction purpose. **(04 Marks)**

b. Describe the construction and working of Bull's trench kiln. **(06 Marks)**

c. What is bulking of sand? Mention its practical importance. Explain the size of sand grain on bulking of sand. **(06 Marks)**

OR

2 a. Describe the constituents of good brick earth along with their importance. **(04 Marks)**

b. Explain the factors causing deterioration of stone work and preservation of stone work. **(06 Marks)**

c. Briefly explain the importance of shape, size and texture of coarse aggregates in concrete work. **(06 Marks)**

Module-2

3 a. What is foundation and what are its functions? **(04 Marks)**

b. Differentiate between strip footing and strap footing with sketches. **(06 Marks)**

c. Describe salient features of English bond with an elevation sketch of burnt brick masonry wall. **(06 Marks)**

OR

4 a. Explain the importance of load bearing wall and partition wall in construction of buildings. **(04 Marks)**

b. Describe the types of Ashlar type of stone masonry with sketches. **(06 Marks)**

c. Explain the construction and importance of Grillage foundation with its plan view. **(06 Marks)**

Module-3

5 a. Differentiate between stone lintel and RCC lintel with sketches. **(04 Marks)**

b. Explain the construction of marble flooring in ground floor of building with sketch. **(06 Marks)**

c. Differentiate between lean-to-roof and couple roof with sketches. **(06 Marks)**

OR

6 a. Sketch king post roof truss label its parts (half portion). **(04 Marks)**

b. Mention the requirements of good floor. What are the factors affecting selection of flooring material. **(06 Marks)**

c. Explain the factors affecting stability of arches. **(06 Marks)**

Module-4

7	a.	Mention the requirements of good stair.	(04 Marks)
	b.	Explain raking shore with a neat sketch.	(06 Marks)
	c.	Differentiate between flush door and louvered door with sketches.	(06 Marks)

OR

8	a.	Briefly explain types of stairs.	(04 Marks)
	b.	Explain with neat sketches : (i) Bay window (ii) Corner window	(06 Marks)
	c.	Differentiate between brick layers scaffolding and Mason's scaffolding.	(06 Marks)

Module-5

9	a.	Explain the procedure of painting of newly plastered wall surface.	(04 Marks)
	b.	Write the objectives of plastering and requirements of good plaster.	(06 Marks)
	c.	Briefly explain the methods of damp proofing.	(06 Marks)

OR

10	a.	Explain the procedure adopted in stucco plastering.	(04 Marks)
	b.	Explain the importance of constituents of a paint.	(06 Marks)
	c.	Describe the defects in plastering.	(06 Marks)

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CBCS SCHEME

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15CV42

Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019
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. Explain briefly about different types of structural forms with the aid of neat sketches. **(06 Marks)**

b. What is linear and non-linear structural system? **(03 Marks)**

c. Analyse the pin jointed plane truss as shown in Fig.Q1(c) by method of joints and hence tabulate the member forces. **(07 Marks)**

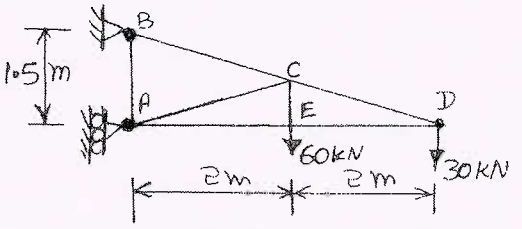

Fig.Q1(c)

OR

2 a. Explain briefly the following :
i) Conditions of equilibrium
ii) Determinate and indeterminate structures
iii) Degree of freedom. **(06 Marks)**

b. List the assumptions made in the analysis of pin jointed plane truss. **(03 Marks)**

c. Determine the force in the members CD, DF, EF and CF for the pin jointed plane truss as shown in Fig.Q2(c) by the method of sections. **(07 Marks)**

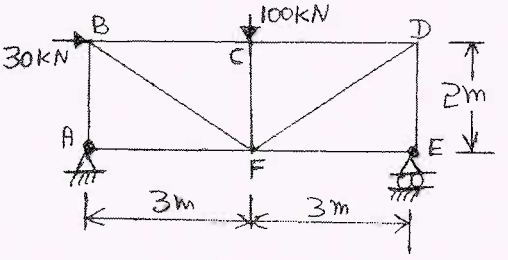

Fig.Q2(c)

Module-2

3 a. Derive the second order differential expression $EI\frac{d^2y}{dx^2} = m$ with usual notations. **(06 Marks)**

b. Calculate the deflection at point C and slope at point A for the beam loaded as shown in Fig.Q3(b) by moment area method. **(07 Marks)**

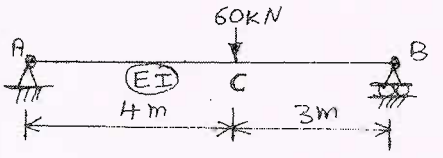

Fig.Q3(b)

c. State the moment area theorems. **(03 Marks)**

OR

4 a. Calculate the deflections at points C and D and maximum deflection and its location for the beam as shown in Fig.Q4(a) by Macaulay's method. Take value of EI = 17000 kN-m^2. **(09 Marks)**

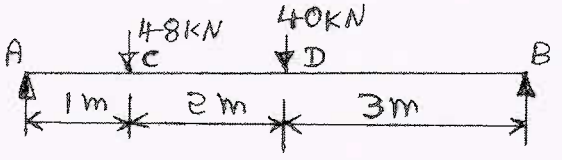

Fig.Q4(a)

b. Calculate the maximum deflection and slope in the beam loaded as shown in Fig.Q4(b) by conjugate beam method. **(07 Marks)**

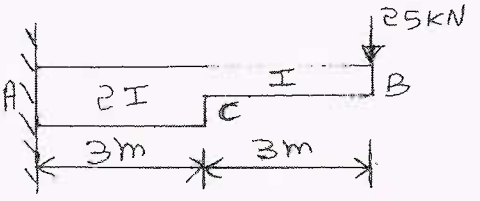

Fig.Q4(b)

Module-3

5 a. Derive the expression for strain energy stored in an prismatic element subjected to pure bending moment. **(05 Marks)**

b. Explain briefly what is complimentary strain energy. **(02 Marks)**

c. Determine the vertical and horizontal deflection point C for the mill bent as shown in Fig.Q5(c) by unit load method. **(09 Marks)**

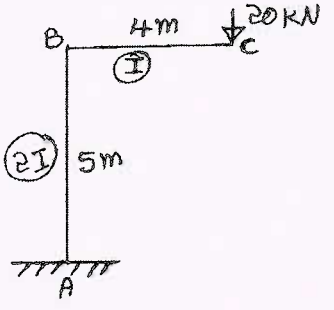

Fig.Q5(c)

OR

6 a. Sate Castigliano's theorems I and II. **(03 Marks)**

b. Determine the vertical deflection at point C for the pin jointed plane truss as show in Fig.Q6(b) by strain energy method. Cross section are of each member is 5000mm^2 and E = 2×10^5 N/mm^2. **(07 Marks)**

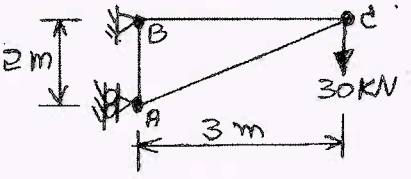

Fig.Q6(b)

c. Determine the deflection at point C for the beam loaded as shown in Fig.Q6(c) by unit load method. **(06 Marks)**

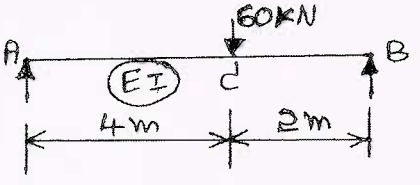

Fig.Q6(C)

Module-4

7 a. A three hinged parabolic arch is having a span of 36m. It is subjected to uniformly distributed load of intensity 30kN/m from left support hinge to crown hinge. Determine the normal thrust, radial shear and bending moment at quarter span point located from left support. **(08 Marks)**

b. A cable is suspended from two points 'A' and 'B' which are 80m apart. 'A' is positioned 5m below 'B'. The lowest point on the cable is 10m below point 'A'. The cable supports a uniformly distributed load of intensity 20kN/m over the entire span. Calculate reaction at supports and maximum tension in the cable. **(08 Marks)**

OR

8 a. Calculate the support reactions, normal thrust and radial shear at point 'D' for a three hinged parabolic arch as shown in Fig.Q8(a). **(08 Marks)**

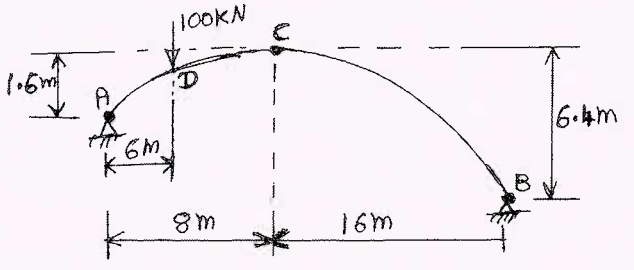

Fig.Q8(a)

b. A three hinged stiffening girder of suspension bridge of span 120m is subjected to two point loads of 480kN and 600kN at distances of 25m and 80m from the left support respectively. The dip of the cable is 12m. Calculate maximum tension in the cable and shear force, bending moment values for the stiffening girder at 40m from the left support. **(08 Marks)**

Module-5

9 a. Determine the shear force at a section located 3m from left support by constructing influence line diagram for the beam with loading as shown in the Fig.Q9(a). **(07 Marks)**

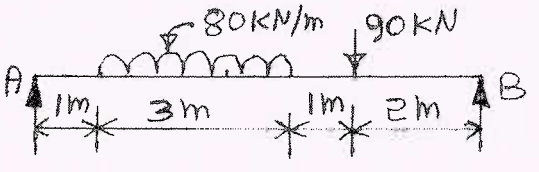

Fig.Q9(a)

b. A system of wheel loads move from left end to right end as shown in Fig.Q9(b) on a beam simply supported and having a span of 10m. Calculate the maximum bending moment which can occur at a section located 4.0m from the left end. **(07 Marks)**

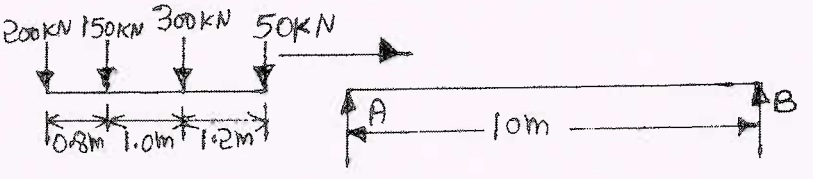

Fig.Q9(b)

c. Explain briefly what is influence line diagram. **(02 Marks)**

OR

10 a. Determine the influence line diagrams for the forces in the members U_1U_2, U_2U_3, L_2L_3, U_2L_2 and U_2L_3 for the part truss as shown in Fig.10(a). **(10 Marks)**

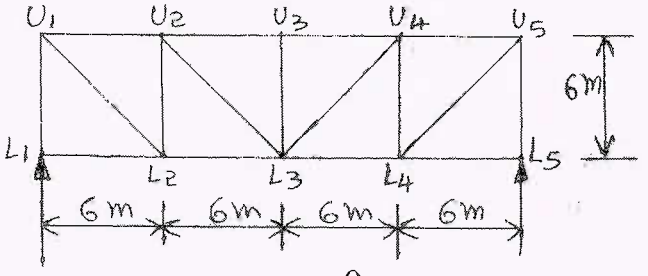

Fig.Q10(a)

b. A moving load travels from left to right on a girder of span 10m as shown in Fig.Q10(b). Determine the absolute maximum benign moment acting in the girder. **(06 Marks)**

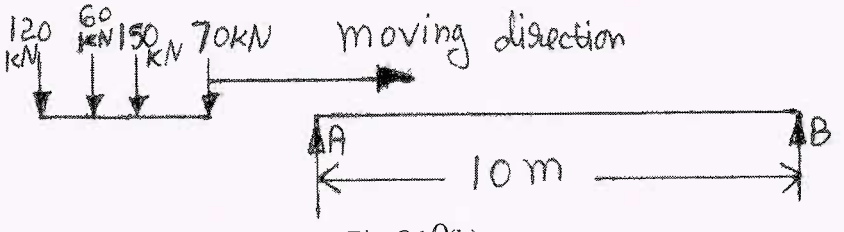

Fig.Q10(b)

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CBCS SCHEME

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15CV43

Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019
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. State and prove the Buckingham's π – Theorem. Why this theorem is considered superior over the Rayleigh's method. **(08 Marks)**

b. The discharge though a water is $1.5m^3/s$ find the discharge though the model of the weir if the horizontal dimension of the model is $\frac{1}{50}$ the horizontal dimension of the protype and vertical dimension of the model is $\frac{1}{10}$ the vertical dimension of the prototype. **(08 Marks)**

OR

2 a. Derive an expression for the Reynolds's number Froude number's **(08 Marks)**

b. A rectangular pontoon is 5m long 3m wide and 1.20m high. The depth of immersion of the pontoon is 0.80m in sea water. If the centre of gravity is 0.6m above the bottom of the pontoon, determine the meta centric height. The density for sea water is 1025 kg/m^3. **(08 Marks)**

Module-2

3 a. Derive an expression for the most economical trapezoidal section. **(08 Marks)**

b. The discharge of water through a rectangular channel of width 8m is $15m^3/s$ when the depth of flow of water is 1.2m, 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. What is specific energy curve? Draw it and derive expressions for critical depth and critical velocity. **(08 Marks)**

b. A trapezoidal channel has side slopes of 1 horizontal to 2 vertical and the slopes of the bed is 1 in 1500. The area of the section is $40m^2$. Find the dimensions of the section. If it is most economical. Determine the discharge of the most economical section if c = 50. **(08 Marks)**

Module-3

5 a. Explain the term standing wave. Derive an expression for the depth of standing wave in terms of the u/s Fronde number. **(08 Marks)**

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

OR

6 a. Explain Back water curve and Afflux. **(04 Marks)**

b. A sluice gate discharge water in to a horizontal rectangular channel with a velocity of 6m/s and a depth of flow is 0.4m. the width of the channel is 8m. Determine whether a hydraulic jump will occur and if so, find its height and loss of energy per kg of water. Also determine the power lost in the hydraulic jump. **(12 Marks)**

Module-4

7 a. Derive an expression for the impulse momentum equation. **(08 Marks)**

b. A Pelton wheel is working with a gross head of 500m. One third of the gross head is lost in friction in the penstock. The rate of flow of water through the nozzle fitted at the end of the penstock is $2.0m^3/s$. The angle of deflection of the jet is 165°. Determine the power given by the water to the runner and also hydraulic efficiency of the Pelton wheel. Take speed ratio = 0.45 and $C_v = 1.0$. **(08 Marks)**

OR

8 a. Obtain an expression for the work done per second by water on the runner of a pelton wheel. Hence derive an expression for maximum efficiency of the pelton wheel. **(08 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 of 60° to the direction of motion of vane at out let. Determine :

i) The force exerted by the jet on the vane in the direction of motion

ii) Work done per second by the jet. **(08 Marks)**

Module-5

9 a. By means of a neat sketch, explain the Francis Turbine. **(08 Marks)**

b. Find the power required to derive a centrifugal pump which delivers $0.04m^3/s$ of water to a height of 20m through a 15cm diameter pipe and 100m long. The overall efficiency of the pump is 70% and coefficient of friction f = 0.15 in the formula $h_f = \frac{4flv^2}{2gd}$ **(08 Marks)**

OR

10 a. Define specific speed of a centrifugal pump. Derive on expression for the specific speed. **(08 Marks)**

b. The following data is given for a Francis Turbine, Net head H = 60m speed, N = 700rpm ; shaft power = 294.3kW ; $\eta_0 = 84\%$, $\eta_4 = 93\%$ flow ratio = 0.20 ; breadth ratio n = 0.1 ; outer diameter of the runner = 2 × inner diameter of runner. The thickness of vanes occupy 5% of circumferential area of the runner, velocity of flow is constant at inlet and outlet and discharge is radial at outlet. Determine :

i) Guide blade angle

ii) Runner vane angles at inlet and outlet

iii) Diameters of runner at inlet and outlet

iv) Width of wheel at inlet. **(08 Marks)**

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CBCS SCHEME

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15CV/CT44

Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Concrete Technology

Time: 3 hrs. Max. Marks: 80

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. Any missing data may be suitably assumed.
3. IS-10262 mix design code is allowed.

Module-1

1 a. Briefly explain the manufacturing of cement by dry process using flow chart. **(08 Marks)**

b. What are Bogue's compounds? Briefly explain their contribution towards gaining of strength of cement. **(08 Marks)**

OR

2 a. List the types of cement and briefly explain the properties and application of any four types of cement. **(08 Marks)**

b. What are admixtures, classify them and briefly explain their role in concrete technology? **(08 Marks)**

Module-2

3 a. Define workability and briefly explain the factors influencing workability of concrete. **(08 Marks)**

b. What are the effect of segregation and bleeding on the property of hardened concrete? **(08 Marks)**

OR

4 a. Explain the process of hydration of cement, its significance and the chemical reactions involved. **(08 Marks)**

b. Enumerate the need of compaction in concreting and list the methods of compaction. **(08 Marks)**

Module-3

5 a. List the factors that affect the strength of hardened concrete and explain briefly any two of them. **(08 Marks)**

b. Define:
i) Elastic stain in concrete
ii) Elastic modulus
iii) Creep
iv) Shrinkage. **(08 Marks)**

OR

6 a. What is maturity of concrete and briefly explain its significance in the gaining of strength of concrete? **(08 Marks)**

b. List the tests that can be conducted on hardened concrete to check its strength and explain any one of them. **(08 Marks)**

Module-4

7 Design a concrete Mix for M$_{xx}$ grade of concrete as per IS 10262-2009 with following data:

i) Design stipulations

- Characteristic compressive strength required in field at 28 days - 20 MPa
- Max size of aggregate (angular) - 20mm
- Degree of workability - 0.9 compaction factor
- Degree of quality control - Good
- Type of exposure - Mild

ii) Test data for materials

- Specific gravity of cement - 3.15
- Specific gravity of coarse aggregates - 2.60
- Specific gravity fine aggregates - 2.60
- Water absorption for coarse aggregate - 0.50%
- Water absorption for fine aggregates - 1.0%
- Surface moisture for coarse aggregates - Nill
- Surface moisture for fine aggregates - 2.0%
- Sieve analysis of coarse aggregates - Confirming to table 2 of IS: 383
- Sieve analysis of fine aggregates - Confirming to zone – II of IS: 383

(16 Marks)

OR

8 What is the significance of concrete mix design and explain the steps involved in it? **(16 Marks)**

Module-5

9 a. Write short notes on : i) Ferro cement ii) Self compacting concrete. **(08 Marks)**

b. What is RMC? How its manufactured? Explain briefly. **(08 Marks)**

OR

10 a. What is light weight concrete? State its advantages. **(08 Marks)**

b. Write note on fibre reinforced concrete. **(08 Marks)**

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CBCS SCHEME

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15CV45

Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019
Basic Geotechnical Engineering

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define : i) Void ratio ii) Porosity iii) Degree of saturation iv) Air content. **(08 Marks)**

b. Explain the procedure to determine density of soil by core cutter method and sand replacement method. **(08 Marks)**

OR

2 a. Explain Atterberg's limits. **(06 Marks)**

b. The liquid and plastic limits of a given soil sample are 65% and 40% respectively. Compute its consistency index, liquidity index, flow index and toughness index. Given that the water content in the soil sample decreases from 80% to 40% for a ten fold increase in the number of blows required to close the groove in the standard liquid limit apparatus. **(10 Marks)**

Module-2

3 a. Explain with neat sketches, the soil structure. **(08 Marks)**

b. Describe the three principal clay minerals. **(08 Marks)**

OR

4 a. What are the objectives of compaction? **(04 Marks)**

b. List the factors affecting compaction. **(04 Marks)**

c. Following are the observations of compaction test:

Water content %	Weight of wet soil (N)
7.7	16.67
11.5	18.54
14.6	19.92
17.5	19.52
19.5	19.23
21.2	18.83

If the volume of compaction mould is 950 CC and G = 2.65, determine the dry unit weight and OMC. **(08 Marks)**

Module-3

5 a. Explain the laboratory method of determination of permeability by constant head method and variable head method. **(08 Marks)**

b. The following details refer to a test to determine the permeability of soil.
Thickness of specimen = 25mm
Diameter of stand pipe = 10mm
Initial head = 1000mm
Final head = 800mm
Determine the permeability of soil. If the void ratio of sample is 0.75, what is the permeability of same soil at a void ratio of 0.9? **(08 Marks)**

OR

6 a. What are the important properties of flow nets? **(04 Marks)**

b. The porosity of a certain sample of sand was 50% in the loose state and 34% in the dense state. The specific gravity is 2.70. Estimate the critical hydraulic gradients in loose and dense states. **(04 Marks)**

c. A clay strata of thickness 8m is located at a depth of 6m below ground surface. It is overlaid by fine sand. The water table is located at a depth of 2m below the ground surface. For fine sand the submerged unit weight is 10.2 kN/m^3. The moist unit weight of sand located above the water table is 16kN/m^3. For clay layer, G = 2.76 and water content = 25%. Compute the effective stress at the middle of clay layer. **(08 Marks)**

Module-4

7 a. Explain Mass-Spring analogy. **(08 Marks)**

b. What are the assumptions made in Terzaghis theory of one-dimensional consolidation? **(08 Marks)**

OR

8 a. Explain compressibility of soil and volume change. **(04 Marks)**

b. Differentiate between normally consolidated soil and over-consolidated soil. **(04 Marks)**

c. A saturated specimen of clay had undergone consolidation under a pressure of 200kN/m^2 in an oedometer test. The thickness of the specimen was found to be 21.18mm and its water content 12%. Subsequently, with a further increase in pressure of 100kN/m^2, the thickness of specimen at the end of 24 hrs was reduced by 1.18mm. Compute the coefficient of volume compressibility and compression index of soil G = 2.7. **(08 Marks)**

Module-5

9 a. Explain Mohr's Coulombs failure theory and draw the failure envelope for different soils. **(08 Marks)**

b. What are the factors affecting the shear strength of soil? **(04 Marks)**

c. What are the advantages and disadvantages of direct shear test? **(04 Marks)**

OR

10 a. Explain triaxial compression test and what are the advantages of triaxial test. **(08 Marks)**

b. Following results are obtained from a direct shear test on a soil at failure,

Normal load (N)	100	200	300	400
Shear load (N)	90	181	270	362

Size of the box = 6cm × 6cm. Determine shear strength parameters. **(08 Marks)**

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CBCS SCHEME

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15CV46

Fourth Semester B.E. Degree Examination, Dec.2018/Jan.2019
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. With the help of a neat sketch of a simple circular curve? Explain:
i) Tangent length; ii) Length of long chord; iii) Length of curve; iv) Summit distance; v) Vertex distance; vi) Intersection angle. **(06 Marks)**

b. Two tangents intersect at a chainage (59 + 60), the deflection angle being 50°30′. Calculate the necessary data for setting out a curve of 15 chains radius to connect the two tangents, if it is intended to set out the curve by Rankine's method of deflection angles. Take the peg interval equal to 100 links, the length of the chain being 20m (100 links). Draw the curve table. **(10 Marks)**

OR

2 a. With the help of neat sketch, explain the elements of a compound cure. **(06 Marks)**

b. A road bend which deflects 80° is to be designed for a maximum speed of 100km per hour, a maximum centrifugal ratio 1/4 and a maximum rate to the change of acceleration of 30cm/sec^3, the curve consisting of a circular arc combined with two spirals. Calculate: i) The radius of circular arc ii) The required length of transition iii) The total length of composite curve and iv) The chainages of the beginning and end of transition curve, and of the junctions of the transition curves with the circular arc, if the chainage of the point of intersection is 42862 metres. **(10 Marks)**

Module-2

3 a. Explain orders of triangulation. **(06 Marks)**

b. Explain any four points to be kept in mind while selecting triangulation stations. **(04 Marks)**

c. From an eccentric station S, 12.25 metres to the west of the main station B, the following angles were measured. $\angle BSC = 76°25'32''$, $\angle CSA = 54°32'20''$. The stations S and C are to the opposite sides of line AB. Calculate the correct angle ABC if the lengths of AB and BC are 5286.5 and 4932.2m respectively. **(06 Marks)**

OR

4 a. Explain: i) Observed value of a quantity; ii) Most probable value; iii) Observation equation; iv) Conditioned equation; v) Indirect observation; vi) Normal equation. **(06 Marks)**

b. Adjust the following angles closing horizon.

$\angle A = 110° 20' 48''$ _____ wt 4

$\angle B = 92° 30' 12''$ _____ wt 1

$\angle C = 56° 12' 00''$ _____ wt 2

$\angle D = 100° 57' 04''$ _____ wt 3 **(10 Marks)**

Module-3

5 a. Define the terms:
   i) The Zenith and Nadir
   ii) The celestial poles and equator
   iii) The sensible horizon
   iv) The visible horizon
   v) The altitude (α)
   vi) Co-latitude. **(06 Marks)**

b. Find the shortest distance between two points A and B given that the latitudes of A and B are 15° 0′ N and 12° 6′ N and their longitudes are 50°12′E and 54° 0′ E respectively. Find also the direction of B on the great circle route. Radius of Earth = 6370 km. **(10 Marks)**

OR

6 a. State that properties of a spherical triangle. **(05 Marks)**

b. Show that one nautical mile is equal to 1.852 km. **(04 Marks)**

c. Calculate the distance in kilometers between two points A and B along the parallel of latitude given that:
   i) Latitude of A, 28°42′ N; longitude of A = 31°12′ W
   Latitude of B, 28°42′ N; longitude of B = 47°24′ W
   ii) Latitude of A; 12°36′ S; longitude of A = 115°6′ W
   Latitude of B; 12°36′ S; longitude of B = 150°24′ E. **(07 Marks)**

Module-4

7 a. Define the terms: i) Camera axis; ii) Picture plane; iii) principal plane; iv) print ; v) Fuducial axis; vi) Film base. **(06 Marks)**

b. Three points A, B and C were photographed and their coordinates with respect to the lines joining the collimation marks on the photograph are:

Point	x	y
a	-35.52mm	+21.43mm
b	+8.48mm	-16.38mm
c	+48.26mm	+36.72mm

The focal length of lens is 120.80mm. Determine the azimuths of the lines OB and OC if that of OA is 354° 30′. The axis of camera was level at the time of exposure at the station O. **(10 Marks)**

OR

8 a. Derive a relation for the scale of a vertical photograph. **(06 Marks)**

b. A vertical photograph was taken at an altitude of 1200 metres above the mean sea level. Determine the scale of photograph for terrain lying at elevation of 80 metres and 300 metres, if the focal length of camera is 15cm. **(10 Marks)**

Module-5

9 a. Enumerate three types of measurement of distance with instruments used. **(06 Marks)**

b. With sketches explain properties of electromagnetic waves and electromagnetic spectrum. **(10 Marks)**

OR

10 a. Explain the components of GIS. **(08 Marks)**

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

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CBCS SCHEME

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17CV/CT32

Third Semester B.E. Degree Examination, June/July 2019
Strength of Materials

Time: 3 hrs. Max. Marks: 100

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. With a neat sketch, define salient features of stress – strain curve for a tensile specimen. **(06 Marks)**

b. Define the following terms :
i) True stress ii) Proof stress iii) Poisson's ratio. **(06 Marks)**

c. A compound bar consists of a circular rod of steel of diameter 20mm rigidly fitted into a copper tube of inner diameter 20mm and thickness 5mm both of same length. If both are subjected to a load of 100kN, find the stress developed in the two materials. E_S = 200 GPa and E_C = 120GPa. **(08 Marks)**

OR

2 a. Derive an expression for elongation of a tapering plate of thickness t, subjected to a tensile force. **(08 Marks)**

b. Explain temperature stresses induced in a body and derive an expression to find the same. **(04 Marks)**

c. A composite bar made of aluminium and steel is held between two supports. Find the stresses in the bars when temperature falls by 20°C, given that the length of steel and aluminium bars are 600mm and 300mm and cross sectional areas are 200mm^2 and 300mm^2 respectively.
$\alpha_S = 11.7 \times 10^{-6}$/°C and $\alpha_a = 23.4 \times 10^{-6}$/°C, E_S = 210GPa and E_a = 70 GPa. **(08 Marks)**

Fig.Q2(c)

Module-2

3 a. For a state of stresses with σ_X = 85 MPa (Tensile), σ_Y = 60 MPa (compressive) with a shear stress of 45 MPa, determine the principal stresses and locate principal planes. Also obtain maximum tangential stress and locate corresponding planes (Fig.Q3(a)). **(10 Marks)**

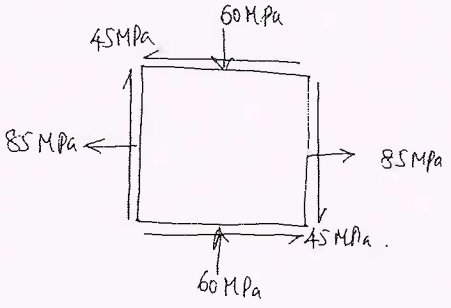

Fig.Q3(a)

b. Derive an equation for change in volume for a thin cylinders. **(10 Marks)**

OR

4 a. Derive an expression for normal and tangential stresses on an inclined plane whose normal makes an angle θ with the inclination of σ_X. **(10 Marks)**

b. A pipe of 400mm internal diameter and 100mm thickness contains a fluid at a pressure of 80MPa. Find the maximum and minimum hoop stress across section. Sketch the radial and hoop stress distribution across the section. **(10 Marks)**

Module-3

5 a. Define shear force and bending moment along with sign convention and units. **(06 Marks)**

b. For the beam shown in Fig.Q5(b), draw the shear force and bending moment diagram and locate the point of contraflexure. **(14 Marks)**

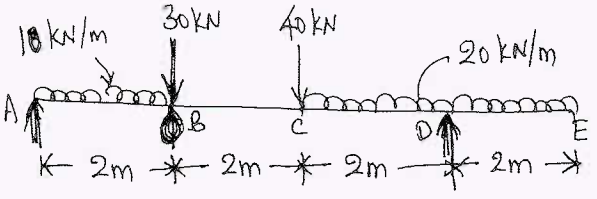

Fig.Q5(b)

OR

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

b. Draw shear force and bending moment diagram for the beam shown in Fig.6(b). Locate the points of contraflexure. **(14 Marks)**

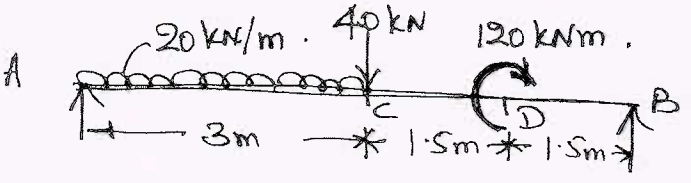

Fig.6(b)

Module-4

7 a. Derive the torsional equation for a circular shaft.

$$\frac{T}{J} = \frac{\tau_x}{R} = \frac{C\theta}{l}.$$ **(10 Marks)**

b. A component is subjected to the following stresses σ_X = 60MPa, σ_Y = 45MPa, τ_{XY} = 30 MPa. The yield stress of the material is 300MPa and Poisson's ratio 0.3. Find the factor of safety using maximum principal stress theory, maximum shear stress theory and maximum principal strain theory. **(10 Marks)**

OR

8 a. Explain momentum principal stress, maximum shear stress and principal strain theories of failure. Derive the necessary equations to assess the failure. **(10 Marks)**

b. A solid shaft transmits 250 kW at 100rpm. If the shear stress is not to exceed 75 MPa, what should be the diameter of the shaft? If this shaft is to be replaced by a hollow one, whose diameter ratio is 0.6, determine the size and percentage saving in weight the maximum shear stress being the same. **(10 Marks)**

Module-5

9 a. Derive the equation of pure bending $\frac{M}{I} = \frac{f}{y} = \frac{E}{R}$ with usual notations. State the assumptions. **(10 Marks)**

b. Find the Euler's crippling load for a hallow cylindrical steel column of 40mm diameter and 4mm thick. Take the length of the column as 2.3m and column is hinged at both ends. Also determine the crippling load by Rankine's formula using constants as 335MPa and 1/75,000. Take $E = 205 \times 10^3 N/mm^2$. **(10 Marks)**

OR

10 a. State the assumptions and derive an expression for Euler's crippling load for a column with both ends hinged. **(10 Marks)**

b. A simply supported beam 100mm×200mm carries a central concentrated load W. The permissible stress in bending and shear are 15MPa and 1.2MPa respectively. Determine the safe load W, if the span of the beam is 3m. **(10 Marks)**

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CBCS SCHEME

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17CV33

Third Semester B.E. Degree Examination, June/July 2019
Fluid Mechanics

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Define the following with symbols and units :
i) Weight density
ii) Specific volume
iii) Density. **(06 Marks)**

b. What do you mean by single column manometer? Derive the expression for vertical single column manometer. **(06 Marks)**

c. The right limb of a simple U–tube manometer containing mercury is open to the atmosphere while the left limb is connected to a pipe which a fluid of sp.gr. 0.9 is flowing. The centre of the pipe is 12cm below the level of the mercury in the right limb. Find the pressure of fluid in the pipe. If difference of mercury level in the two limb is 20cm. **(08 Marks)**

OR

2 a. What is capillarity? Derive an expression for capillarity rise for a liquid in a glass tube. **(06 Marks)**

b. Explain difference between i) absolute and gauge pressure ii) Newtonian and non Newtonian iii) ideal fluid and real fluid iv) simple manometer and differential manometer. **(08 Marks)**

c. Calculate pressure due to a column of 0.4 of i) water ii) an oil of sp.gr 0.9 and iii) mercury of sp.gt 13.6. Take density water $\rho = 1000 kg/m^3$. **(06 Marks)**

Module-2

3 a. Derive an expression for total pressure and centre of pressure of a inclined plane surface immersed in a liquid. **(08 Marks)**

b. Determine eth total pressure and depth of centre of pressure on a plane rectangular surface of 1m wide and 3m deep when its upper edge is horizontal and i) coinsides with water surface ii) 2m below the free water surface. **(06 Marks)**

c. A circular plate 3m diameter is immersed in water in such way that its greatest and least depth below the free surface are 4m and 1.5m respectively. Determine the total pressure on one face of the plate and position of centre of pressure. **(06 Marks)**

OR

4 a. Define :
i) Uniform and non-uniform flow
ii) Rotational and irrotational flow
iii) Stream line and path line
iv) Laminar and turbulent flow. **(08 Marks)**

b. Derive the three dimensional continuity equation in the Cartesian coordinates. **(06 Marks)**

c. A 40cm diameter pipe, conveying water, branches into two pipes of diameter 30cm and 20cm respectively. If the average velocity in the 40cm pipe is 3m/sec. Find the discharge in the pipe. Also determine velocity in 20cm pipe if the average velocity in 30cm diameter pipe is 2m/sec. **(06 Marks)**

Module-3

5 a. Derive an expression for Bernoulli's equation and state the assumption made for such a derivation. **(06 Marks)**

b. What is venturimeter? Derive an expression for the discharge through venturimeter. **(08 Marks)**

c. Water flowing through a pipe having diameter 30cm and 15cm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 29.43N/cm^2 and pressure at the upper end is 14.715N/cm^2. Determine the difference datum head if the rate of flow through the pipe is 50lit/sec. **(06 Marks**

OR

6 a. Define the terms : i) Free vortex ii) Forced vortex **(04 Marks)**

b. State the momentum equation. How will you apply the momentum equation for determining the force exerted by flowing liquid on a bend? **(08 Marks)**

c. 250 lit/sec of water is flowing in a pipe having diameter of 300mm. If the pipe is bent by 135°(i.e changes from initial to final direction is 135°). Find the magnitude and direction on of the resultant force on the bend. The pressure of water flowing is 39.24N/cm^2. **(08 Marks)**

Module-4

7 a. Prove that the discharge over triangular notch is $Q = \frac{8}{15} cd\sqrt{2g} \tan\theta / 2H^{\frac{5}{2}}$. **(08 Marks)**

b. Explain the experimental determination of hydraulic coefficients C_d, C_V and C_C. **(06 Marks)**

c. The head of water over an orifice of diameter 100mm is 5m. The water coming out from the orifice is collected in a circular tank of diameter 2m. The rise of water level in this tank is 0.45min 30Sec. Also coordinates of certain print of jet, measured by venacontracts are 100cm horizontal and 5.2cm vertical. Find the hydraulic coefficients C_d, C_V and C_C. **(06 Marks**

OR

8 a. Distinguish between : i) Notch and Weir ii) Orifice and mouthpiece. **(04 Marks)**

b. What is cipolleti weir? Prove that the discharge through cipolleti Weir is given by $Q = \frac{2}{3} cd\sqrt{2g}\, H^{\frac{3}{2}}$. **(08 Marks)**

c. The water flowing in a rectangular channel of 1.2m wide and 0.8m deep. Find the discharge over the rectangular Weir of the crest length 70cm. If the head of water over the crest of weir is 25cm and water form channel flows over the weir. Take C_d = 0.60 Neglect end contraction but consider velocity of approach. **(08 Marks)**

Module-5

9 a. Explain the term s with neat sketch : i) Pipes in parallel ii) Piopes in series iii) Hydraulic gradient line iv) Total energy line. **(08 Marks)**

b. Three pipes of length 800m, 500m and 400m and of diameter 500mm, 400mm and 300mm respectively are connected by a single pipe of length 1700m. Find the diameter of the single pipe. **(06 Marks)**

c. Find the diameter of the pipe of length 2500m when the rate of flow of water through the pipe is 0.25m^3/sec and head loss due to friction is 5m. Take C = 50 in Chezy's formula. **(06 Marks)**

OR

10 a. What do you mean by equivalent pipe? Obtain an expression for equivalent pipe. **(08 Marks)**

b. Derive expression for the loss of head due to sudden expansion in the pipe. **(08 Marks)**

c. Find the loss of head when pipe of diameter 200mm is suddenly enlarged to a diameter of 400mm. The rate of flow of water through the pipe is 250lit/sec. **(04 Marks)**

CBCS SCHEME

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17CV34

Third Semester B.E. Degree Examination, June/July 2019
Basic Surveying

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain fundamental principles of surveying. **(06 Marks)**

b. Differentiate between (i) Plan and map (ii) Accuracy and Precision. **(06 Marks)**

c. A survey line BAC crosses a river, A and C being on the neat and distant banks respectively. Standing at D, a point 100 meters measured perpendicular to AB from A, the bearing of C and B are 230° respectively, AB being 50 meters. Find the width of the river. **(08 Marks)**

OR

2 a. Define surveying. Briefly explain the classification of surveying **(08 Marks)**

b. Explain the methods of chaining on sloping ground. **(04 Marks)**

c. A steel tape 30 meters long standardizing at 60°F with a pull of 10 kg and was used in measuring a baseline. Find the correction per tape length if the temperature at the time of measurement was 85°F and pull exerted was 16 kg. Weight of 1 centimeter cube of steel is 7.86 grams and total weight of tape is 0.8 kg. $E = 2.1\times10^{6}$ kg/cm^2 and co-efficient of expansion of tape per 1°F = 6.2×10^{-6}. **(08 Marks)**

Module-2

3 a. Differentiate between (i) Fore bearing and back bearing (ii) Magnetic bearing and Tone bearing (iii) Magnetic declination and magnetic dip. **(06 Marks)**

b. Explain the uses of theodolite. **(06 Marks)**

c. Determine the included angles in a closed traverse ABCDA conducted in a clockwise direction, given the following bearing observed with a prismatic compass.

Line	AB	BC	CD	DA
Fore bearing	40°	70°	210°	280°

Apply check. **(08 Marks)**

OR

4 a. What are the different methods of measuring horizontal angle using theodolite? Explain any one in detail. **(10 Marks)**

b. Following bearing were observed with a prismatic compass.

Line	AB	BC	CD	DE	EA
Fore bearing	74° 0′	91° 0′	166° 0′	177° 0′	289° 0′
Back bearing	254° 0′	271° 0′	343° 0′	0° 0′	109° 0′

Where do you suspect the local attraction? Find the correct bearings. **(10 Marks)**

Module-3

5 a. Derive distance and elevation formulae for stadia tachometry, when staff held normal to the line of sight, for both an angle of elevation and an angle of depression. **(08 Marks)**

b. The following data is available for a closed traverse ABCDA. Determine closing error and adjust the traverse using transit rule. Take co-ordinates of A(200, 100), compute coordinates of all the stations.

Line	AB	BC	CD	DA
Length (m)	250	123	256	108
Bearing	86° 42′	178° 06′	270° 0′	2° 0′

(12 Marks)

OR

6 a. What are the different methods of balancing the traverse? Explain them. **(08 Marks)**

b. A tachometer is set up at an intermediate point on a traverse course PQ and following observations are made on a vertically held staff.

Staff Station	Vertical angle	Staff intercept	Axial hair readings.
P	+ 8° 36′	2.350	2.105
Q	+ 6° 06′	2.055	1.895

The instrument is fitted with annalistic lens and the constant is 100. Compute the length of PQ and reduced level of Q that of P being 321.50 meters. **(12 Marks)**

Module-4

7 a. Explain temporary adjustments of a dumpy level. **(06 Marks)**

b. Define the following terms: (i) Bench mark (ii) Back sight (iii) Reduced level (iv) Datum. **(04 Marks)**

c. The following staff readings were observed successively with a level, the instrument have been moved forward after the second, fourth and eighth readings.
0.875, 1.235, 2.310, 1.385, 2.930, 3.125, 4.125, 0.120, 1.875, 2.030, 3.765.
The first reading was taken with the staff held upon a bench mark of elevation 132.135m. Enter the readings in a page of level book and reduce the levels. Apply the usual check. **(10 Marks)**

OR

8 a. Compare rise and fall method of reducing levels with the height of collimation method. **(06 Marks)**

b. The following consecutive readings were taken with a level and 5 meter leveling staff on a continuously sloping ground at common interval of 20 meters.
0.585, 1.830, 1.925, 2.825, 3.730, 4.685, 0.825, 2.005, 3.110, 4.485.
The reduced level of first point was 218.125m. Rule out a page of level book and enter the above readings. Calculate the reduced level of points by rise and fall method and also gradient of the line joining first and last point. **(14 Marks)**

Module-5

9 a. What are the different methods of contouring? Discuss the merits and demerits of each. **(08 Marks)**

b. The following give the values in meters of the offsets taken from a chair line to an irregular boundary calculate the area included between the chain line and irregular boundary and first and last offsets by (i) Simpson rule (ii) Trapezoidal rule.

Distance in m	0	50	100	150	200	250	300	350	400
Off sets in m	10.6	15.4	20.2	18.7	16.4	20.8	22.4	19.3	17.6

(12 Marks)

OR

10 a. What are the different characteristics of contour lines? Explain with neat sketches. **(06 Marks)**

b. Discuss the different methods of determining areas. **(04 Marks)**

Calculate the volume of earth work by prismoidal rule in a road embankment with following data:

Chainage along centre line	0	100	200	300	400
Ground level	201.700	202.900	202.400	204.700	205.900

Formation level at chainage 0 is 203.300m, top width is 12.0 meters, side slope is 2 to 1 and longitudinal gradient is 1 in 100. The ground is level across the centre line. **(10 Marks)**

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CBCS SCHEME

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17CV36

Third Semester B.E. Degree Examination, June/July 2019
Building Materials and Construction

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Enumerate the importance of good building stone. **(05 Marks)**
b. Write a brief note on stabilized mud block. **(05 Marks)**
c. Mention the different test conducted on bricks and explain any two test. **(10 Marks)**

OR

2 a. Enumerate the functions of good motor. **(05 Marks)**
b. Mention different types of surface finishes in stones. **(05 Marks)**
c. What is fineness modulus of fine aggregate? Explain the method to determine fineness modulus of fine aggregate. **(10 Marks)**

Module-2

3 a. What are the different types of joints in stone masonry? **(05 Marks)**
b. Define : i) header ii) Lap iii) Bat iv) Frog v) Arris. **(05 Marks)**
c. With neat sketch, explain combined footing and pile foundation. **(10 Marks)**

OR

4 a. Enumerate function of good foundation. **(05 Marks)**
b. Mention different types of partiation walls. **(05 Marks)**
c. Draw the elevation of English and Flemish bond and compare English and Flemish. **(10 Marks)**

Module-3

5 a. Highlight the important qualities of good flooring materials. **(05 Marks)**
b. Discuss various modes of failures of an arch. **(05 Marks)**
c. Briefly explain laying of : i) concrete flooring ii) granite flooring. **(10 Marks)**

OR

6 a. Compare flat roof and sloped roof. **(05 Marks)**
b. Explain different types of lintels. **(05 Marks)**
c. What are the requirements of good roof? Draw a neat sketch of king post truss and show important elements. **(10 Marks)**

Module-4

7 a. State briefly the requirements of good staircase. **(05 Marks)**
b. Discuss importance of formwork in constructional activity. **(05 Marks)**
c. With neat sketch, explain impotence of i) Bay window ii) Collapsible door. **(10 Marks)**

OR

8 a. Draw a neat sketch of paneled door and show important elements. **(05 Marks)**

b. Discuss different types of stairs. **(05 Marks)**

c. Write short notes on the following :

i) Ranking shore ii) underpinning by pit method. **(10 Marks)**

Module-5

9 a. Discuss different types of plaster finishes. **(05 Marks)**

b. What are the causes for the dampness in building? **(05 Marks)**

c. Discuss the constituents of points and importance of the same. **(10 Marks)**

OR

10 a. Enumerate the requirements of good damp proof course. **(05 Marks)**

b. What are the characteristics of ideal point? **(05 Marks)**

c. Explain procedure for :

i) Painting on new iron and steel work

ii) Lime plaster with three coats. **(10 Marks)**

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CBCS SCHEME

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15CV/CT32

Third Semester B.E. Degree Examination, June/July 2019
Strength of Materials

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define : (i) Modulus of Rigidity (ii) Poisson's ratio **(04 Marks)**

b. Prove that the total extension of a uniformly tapering rod of diameter D_1 and D_2 , when the rod is subjected to an axial load 'P' is given by $dl = \frac{4PL}{\pi E D_1 D_2}$. **(06 Marks)**

c. An axial pull of 40,000 N is acting on a bar consisting of three sections of length 300mm, 250mm and 200mm and of diameters 20mm, 40mm and 50mm respectively. If the Young's modulus = 2×10^5 N/mm^2, determine (i) Stress in each section (ii) total extension of the bar. **(06 Marks)**

OR

2 a. Explain elasticity and elastic limit. **(04 Marks)**

b. A steel bar 300mm long, 50mm wide and 40mm thick is subjected to a pull of 300 kN in the direction of its length. Determine the change in volume. Take E = 2×10^5 N/mm^2 and Poisson's ratio = 0.25. **(06 Marks)**

c. A reinforced short concrete column 250mm × 250mm in section is reinforced with 8 steel bars. The total area of steel bars is 2500 mm^2. The column carries a load of 390 kN. If the modulus of elasticity for steel is 15 times that of concrete. Find the stresses in concrete and steel. **(06 Marks)**

Module-2

3 a. Differentiate between thin cylinder and a thick cylinder. Find an expression for the radial pressure and hoop stress at any point in case of a thick cylinder. **(10 Marks)**

b. A rectangular bar of cross section area of 11,000 mm^2 is subjected to a tensile load 'P' as shown in Fig.Q3(b). The permissible normal and shear stresses on the oblique plane BC are given as 7 N/mm^2 and 3.5 N/mm^2 respectively. Determine the safe value of 'P'. **(06 Marks)**

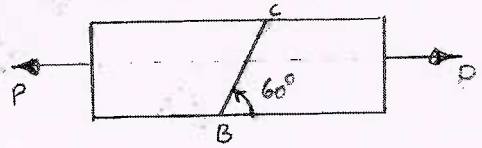

Fig.Q3(b)

OR

4 a. Determine the maximum and minimum hoop stress across the section of a pipe 400mm internal diameter and 100mm thick, when the pipe contains a fluid at a pressure of 8 N/mm^2. Also sketch the radial pressure distribution and hoop stress distribution across the section. **(08 Marks)**

b. At a point in a strained material the principal tensile stresses across two perpendicular planes are 80 N/mm^2 and 40 N/mm^2. Determine normal stress, shear stress and the resultant stress on a plane inclined at 20° with the major principal plane. Determine also the obliquity. **(08 Marks)**

Module-3

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

b. Draw the SF and BM diagrams for a cantilever of length 'L' carrying a point load 'W' at the free end. **(04 Marks)**

c. Draw the SF and BM diagrams of a simply supported beam of length 7 mt carrying uniformly distributed loads as shown in Fig.Q5(c). **(10 Marks)**

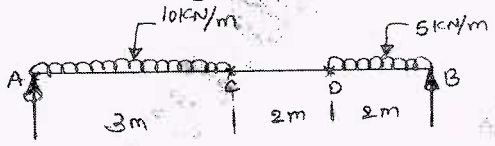

Fig.Q5(c)

OR

6 A horizontal beam 10mt long is carrying a uniformly distributed load of 1 kN/m. The beam is supported on two supports 6 mt apart. Find the position of the supports, so that bending moment on the beam is as small as possible. Also draw the SF and BM diagram. **(16 Marks)**

Module-4

7 a. Define the terms : (i) Neutral axis (ii) Section modulus. **(04 Marks)**

b. A hollow mild steel tube 6m long 40mm internal diameter and 5mm thick is used as a strut with both ends hinged. Find the crippling load and safe load taking factor of safety as 3. Take $E = 2\times10^5$ N/mm^2. **(06 Marks)**

c. The external and internal diameter of a hollow cast iron column are 50mm and 40mm respectively. If the length of this column is 3m and both of its ends are fixed, determine the crippling load using Rankine's formula. Take the values of $\sigma_c = 550$ N/mm^2 and $\alpha = \frac{1}{1600}$ in Rankine's formula. **(06 Marks)**

OR

8 a. Define (i) Buckling load (ii) Slenderness ratio. **(04 Marks)**

b. A timber beam of rectangular section of length 8m is simply supported. The beam carries a U.D.L. of 12 kN/m ran over the entire length and a point load of 10 kN at 3m from the left support. If the depth is two times the width and the stress in the timber is not to exceed 8 N/mm^2, find the suitable dimensions of the section. **(12 Marks)**

Module-5

9 a. List the theories of failures. **(04 Marks)**

b. A hollow shaft of external diameter 120mm transmits 300 kW power at 200 r.p.m. Determine the maximum internal diameter if the maximum stress in the shaft is not to exceed 60 N/mm^2. **(06 Marks)**

c. Determine the diameter of a solid steel shaft which will transmit 90 kW at 160 r.p.m. Also determine the length of the shaft if the twist must not exceed 1° over the entire length. The maximum shear stress is limited to 60 N/mm^2. Take the value of modulus of rigidity = 8×10^4 N/mm^2. **(06 Marks)**

OR

10 a. Derive the relation for a circular shaft when subjected to a torsion as given below:

$$\frac{T}{J} = \frac{\tau}{R} = \frac{C\theta}{L}$$ **(08 Marks)**

b. State and explain theory of maximum principal strain theory. **(08 Marks)**

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CBCS SCHEME

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15CV33

Third Semester B.E. Degree Examination, June/July 2019
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:
- i) Mass density
- ii) Specific volume
- iii) Specific gravity
- iv) Compressible fluid
- v) Incompressible fluid. **(05 Marks)**

b. State Newton's law of viscosity. The velocity distribution over a plate is given by $V = \frac{y}{3} - y^2$, in which 'V' is the velocity in m/sec, at a distance 'y' m above the plate. Find the shear stress at y = 0 and y = 0.1m, $\mu = 0.835$ N-s/m^2. **(05 Marks)**

c. Explain the phenomenon of capillarity obtain an expression for capillary rise of a liquid. **(06 Marks)**

OR

2 a. What are the desirable characteristics of a manometric liquid? **(05 Marks)**

b. Differentiate between:
- i) Absolute and gauge pressure
- ii) Simple manometer and differential manometer
- iii) Piezometer and pressure gauges. **(06 Marks)**

c. Using an inverted U-Tube manometer, find the intensity of pressure at B for the given condition shown in Fig.Q.2(c). Carbon tetrachloride of relative density 1.6 is flowing through the pipe A and B. Water is used as monometer fluid. The pressure at A is 294.33 kN/m^2. **(05 Marks)**

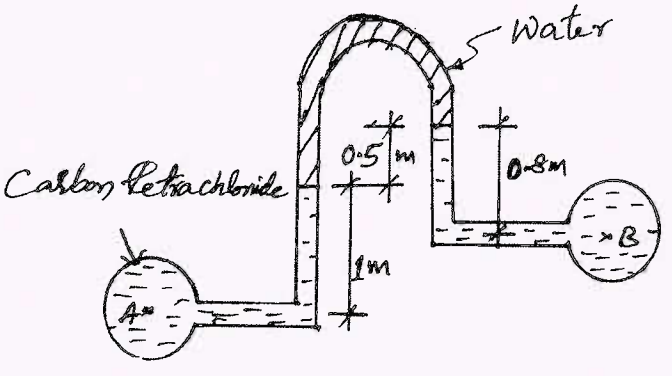

Fig.Q.2(c)

Module-2

3 a. Derive an expression for total pressure on a inclined submerged plane surface. **(04 Marks)**

b. A triangular plate of base width 2m and height 3m is immersed in water with its plane making an angle of 60° with the free surface of water. Determine the hydrostatic pressure force and the position of centre of pressure when the apex of the triangle lies 5m below the free water surface. **(06 Marks)**

c. A concrete dam of trapezoidal section having water on vertical face is 16m high. The base of the dam is 8m wide and top 3m wide. Find the resultant thrust on the base per metre length of the dam water is stored upto top of dam. Take density of masonry = 24 kN/m^3. **(06 Marks)**

OR

4 a. Explain the terms: i) Path line ii) Streak line iii) Stream line and iv) Streams tube. **(04 Marks)**

b. The velocity components in a two-dimensional incompressible flow field are expressed as $u = \frac{y^3}{3} + 2x - x^2y$; $V = xy^2 - 2y - \frac{x^3}{3}$. Determine the velocity and acceleration at point P(x = 1m, y = 3m). **(06 Marks)**

c. The velocity potential function for a two dimensional flow $\phi = x^2 (3y - 2)$. At a point P(2, 3) determine:

i) The velocity at that point.

ii) The value of stream function (ψ) at the point. **(06 Marks)**

Module-3

5 a. What are the different energies of moving fluid? Explain each one of them. **(04 Marks)**

b. Derive the Bernoulli's energy equation from the Euler's motion equation, mentioning clearly the assumption made in the derivation. **(06 Marks)**

c. The water is flowing through a pipe having diameter 20cm and 10cm at section 1-1 and 2-2 respectively. The rate of flow through a pipe is 35 lt/sec. The section 1-1 is 6m above datum and section 2-2 is 4m above datum. If the pressure at section 1-1 is 0.4 N/mm^2. Find the intensity of pressure at section 2-2. **(06 Marks)**

OR

6 a. A pipe of 200mm diameter conveying 0.18m^3/sec of water has a 90° bend in a horizontal plane. The pressure intensities at the inlet and outlet of the bend are 290 kPa and 280 kPa. Find the resultant force exerted by water on the bend. **(08 Marks)**

b. A horizontal venturimeter is provided in a pipe of 30cm diameter conveying water. The throat diameter is 15cm. If the pressure in the pipe is 160 kN/m^2 and the Vaccum pressure of the throat is 35cm of mercury. Find the rate of flow in the pipe. Assume $C_d = 0.98$. **(06 Marks)**

c. A pitot static tube is used to measure the velocity of water in a pipe. The stagnation pressure head is 6m and the static pressure head is 5m. Calculate the velocity of flow. Assume $C_v = 0.98$. **(02 Marks)**

Module-4

7 a. What is orifice? Discuss the classification of orifices. **(06 Marks)**

b. What is mouth piece? Discuss the classification of mouth piece with sketches. **(06 Marks)**

c. The head of water over an orifice of diameter 10cm is 10m. The water coming out from orifice is collected in a circular tank of diameter 1.5m. The rise of water level in this tank is 1m in 25 sec. The co-ordinates of a point on the jet, measured from Vena-contracta are 4.3m horizontal and 0.5m vertical. Find the coefficient of C_d, C_v, C_c? **(04 Marks)**

OR

8 a. Derive an expression for discharge over a rectangular notch in terms of head of water over the crest of the notch. **(06 Marks)**

b. Water flows over a rectangular weir 1m wide at depth of 15cm and afterwards passes through a triangular right angled weir. Taking C_d for the rectangular and triangular weir as 0.62 and 0.59 respectively, find the depth over the triangular weir. **(06 Marks)**

c. Describe a cippoletti weir. Water is flowing over a cippotte weir 4m long under a head of 1m. Compute the **(04 Marks)**

Module-5

9 a. What do you understand by the terms:

i) Major energy loss and minor energy loss.

ii) Total energy line and hydraulic gradient line. **(04 Marks)**

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

c. Water has to be supplied to a town of 4,25,000 in habitants. The reservoir is 6km from the town. The head lost in the pipe line due to friction is measured as 12.5m. Find the size of the supply main if each inhabitant consumes 180 lit of water per day and half the daily supply is pumped in 8 hours. Take f = 0.0075. **(06 Marks)**

OR

10 a. Three pipes of diameters 300mm, 200mm and 400mm and lengths 450m, 225m and 315m respectively are connected in series. The difference in water surface levels in two tanks is 18m. Determine the rate of flow of water if co-efficients of friction are 0.0075, 0.0078 and 0.0072 respectively considering minor losses. **(06 Marks)**

b. Derive an expression for pressure rise due to sudden closure of valve when the pipe material is elastic. **(08 Marks)**

c. Water is flowing in a pipe of 150mm diameter with a velocity of 3.5m/sec. When it is suddenly brought to rest by closing the valve find the pressure rise assuming the pipe is elastic. E = 206 GN/m^2, Poisson's ratio 0.25 and K for water = 2.0 GN/m^2, thickness of wall = 10mm. **(02 Marks)**

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CBCS SCHEME

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15CV34

Third Semester B.E. Degree Examination, June/July 2019
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. Explain the basic principles of surveying. **(08 Marks)**

b. A 30mt chain was tested, before commencement of the day's work and found to be correct. After measuring 3000mt, the chain was found to be 5cm too long. At the end of the days work, after measuring 5400mt, the chain was found to be 10cm too long, what was the true distance chained? **(08 Marks)**

OR

2 a. Define Ranging. Explain direct ranging by the use of line ranger. **(08 Marks)**

b. A chain line ABC crosses a river, B and C being on the near and distant banks respectively. The respective bearings of C and A taken at D, a point 45mt measured at right angles to AB from B are 300° and 210°. The length of AB is 24mt. Find the width of the river. **(08 Marks)**

Module-2

3 a. Distinguish between:
i) Fore bearing and back bearing
ii) Whole circle bearing and reduced bearing
iii) Dip and declination **(06 Marks)**

b. Following are the observed bearings of a closed traverse:

Line	PQ	QR	RS	SP
FB	124°30′	68°15′	310°30′	200°15′
BB	304°30′	246°0′	135°15′	17°45′

At what station local attraction was suspected. Determine the correct bearings of the lines. **(10 Marks)**

OR

4 a. Define the following terms with reference to theodolite:
i) The horizontal axis
ii) Transiting
iii) Line of collimations
iv) Face left observation. **(08 Marks)**

b. Explain repetition method of measurement of horizontal angle by transmit theodolite. List the errors, eliminated by this method. **(08 Marks)**

Module-3

5 a. What is meant by closing error? How it is adjusted by Bowditch method. **(08 Marks)**

b. The table below gives the lengths and bearings of the lines of a transverse ABCDE, the length and bearing at line EA having bean omitted. Calculate the length and bearing of line EA. **(08 Marks)**

Line	Length (M)	Bearing
AB	204.0	87°30′
BC	226.0	20°20′
CD	187.0	280°0′
DE	192.0	210°3′
EA	?	?

OR

6 a. Derive the distance and elevation formulae for staff vertical and the line of fight bearing inclined in Tachometry. **(08 Marks)**

b. A Tachometer was setup at a station 'A' and the readings on a vertically held staff at B were 2.255, 2.605 and 2.955, the line of sight being at an inclination of +8°24′. Another observation on the vertically held staff at BM gave the readings 1.640, 1.920 and 2.200, the inclination of the line of sight being +1°6′. Calculate the horizontal distance between A and B, and the elevation of 'B' if the RL of BM is 418.685 mt, the constants at the instruments were 100 and 0.3. **(08 Marks)**

Module-4

7 a. Explain the temporary adjustments of Dumpy level. **(08 Marks)**

b. The following staff readings were taken with a level, the instrument having been moved after third, sixth and eight readings.
2.225, 1.625, 0.985, 2.095, 2.795, 1.265, 0.605, 1.980, 1.045 and 2.685
Enter the above readings in a page level field book and calculate the R.L. of the points. The first reading was taken on a B.M of elevation 100.000 mt. Use rise and fall method. **(08 Marks)**

OR

8 a. List the sources of Errors in leveling. **(08 Marks)**

b. The following notes refer to reciprocal levels taken with one level:

Instant @	Staff Reading on		
	P	Q	Remains
P	1.824	2.748	Distance between P and Q = 1010 mt
Q	0.928	1.606	RL of P = 126.386 m

Find the i) Time R.L. of Q ii) The combined correction for curvature and retraction. Determine the elevation at the foot of the signal if the height of the signal above its base is 3 mtrs. **(08 Marks)**

Module-5

9 a. Explain the characteristics of contours. **(08 Marks)**

b. The following perpendicular offsets were taken at 10 mt intervals from a survey line to an irregular boundary line.
3.25, 5.60, 4.20, 6.65, 8.75, 6.20, 3.25, 4.20, 5.65
Calculate the area enclosed between the survey line, the irregular boundary line, and the first and last offset by the application of : (i) Average ordinate rule (ii) Trapezoidal rule (iii) Simpson's rule **(08 Marks)**

OR

10 a. The following readings were obtained when an area was measured by a planimeter, the tracing arm was being set to natural scale. The initial and final readings were 2.268 and 4.582. The zero of the disc passed the index mark once in the clockwise direction. The anchor point was inside the figure with the value of constant C of the figure = 26.430.

i) Calculate the area of the figure.

ii) If the area of the figure drawn to a scale of 1 inch =64 feet, find the area of the figure.

(08 Marks)

b. A railway embankment is 10 mt wide with side slopes 1½ to 1. Assuming the ground to be level in a direction transverse to the centre line, calculate the volume contained in a length of 120 mt. The centre height at 20 mt intervals being in meters 2.2, 3.7, 3.8, 4.0, 3.8, 2.8, 2.5.

(08 Marks)

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CBCS SCHEME

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15CV36

Third Semester B.E. Degree Examination, June/July 2019
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. Explain the factors causing deterioration of stonework. **(06 Marks)**

b. List the tests conducted on Fine aggregates. Explain any two tests in detail. **(10 Marks)**

OR

2 a. Write notes on :
(i) Stabilized Mud Blocks (ii) Grading of aggregates (iii) Timber as construction. **(06 Marks)**

b. List the tests on coarse Aggregates. Explain (i) Aggregate Impact test (ii) Aggregate Abrasion test. **(10 Marks)**

Module-2

3 a. What are the functions of good foundation? **(05 Marks)**

b. What are the requirements of good building stones? **(05 Marks)**

c. Briefly explain load bearing walls and cavity walls. **(06 Marks)**

OR

4 a. Define safe Bearing capacity. List the methods of improving bearing capacity of soil and explain any two methods. **(08 Marks)**

b. Find the dimensions of combined rectangular footing for two columns A and B carrying loads 1000 N and 1500kN respectively. Column A is 500mm × 500mm in size and column B is 600mm × 600mm in size. The centre to centre spacing of columns is 5.0m. The SBC of soil may be taken as 250 kN/m^2. The footing is not to project more than 250mm beyond the outer edge of smallest column. **(08 Marks)**

Module-3

5 a. Draw a neat sketch of an arch and explain various technical terms related to an arch. **(08 Marks)**

b. List the types of roofs and explain any two with neat sketches. **(08 Marks)**

OR

6 a. Define Lintel. Explain different types of lintels with neat sketches. **(10 Marks)**

b. Briefly explain the functions of Chejja, Canopy and Balcony. **(06 Marks)**

Module-4

7 a. What are the factors considered while locating Doors and windows? **(05 Marks)**

b. State briefly the requirements of a good stair. **(05 Marks)**

c. Explain with the help of sketches the following terms:
(i) Nosing (ii) Handrail (iii) Landing (iv) Newel post. **(06 Marks)**

OR

8 a. Explain in brief with neat sketches:
(i) Panelled door (ii) Revolving Door (iii) Corner window (iv) Louvered window **(10 Marks)**

b. Plan a dog-legged staircase for a building in which the vertical distance between the floors is 3.0m. The stair hall measures 2.8m × 5.8m. **(06 Marks)**

Module-5

9 a. Discuss the defects in plastering. **(06 Marks)**

b. Explain in brief the causes and effects of dampness. **(10 Marks)**

OR

10 a. List the methods of plastering and explain any two. **(08 Marks)**

b. List the types of paints. Describe the procedure of painting on steel surfaces. **(08 Marks)**

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CBCS SCHEME

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17CV42

Fourth Semester B.E. Degree Examination, June/July 2019
Analysis of Determinate Structures

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Differentiate between statically determinate and indeterminate beams with an example for each. **(06 Marks)**

b. Define degree of freedom. What is the degree of freedom for a i) Fixed support ii) Hinged support. **(04 Marks)**

c. Determine static and kinematic indeterminancy for the following shown in Fig.Q.1(c). **(10 Marks)**

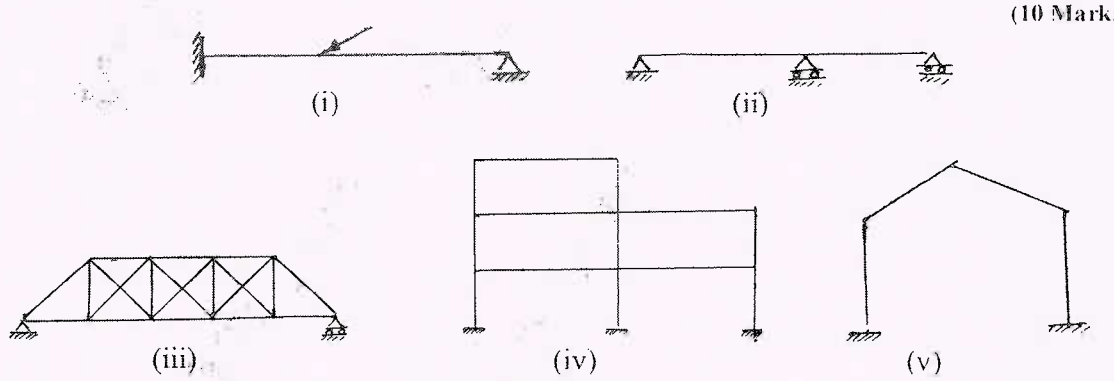
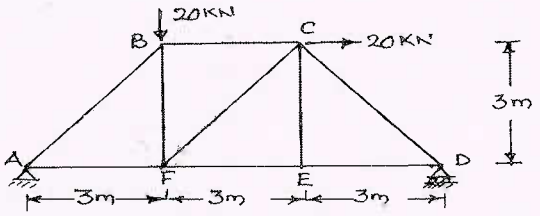


Fig.Q.1(c)

OR

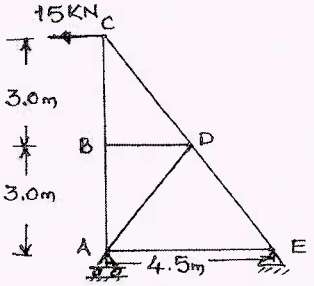
2 a. Determine the forces in all the members of the truss shown in Fig.Q.2(a) use the method of joints. **(12 Marks)**

Fig.Q.2(a)



b. Determine the forces in all the members of the truss shown in Fig.Q.2(b) by the method of section. **(08 Marks)**

Fig.Q.2(b)



Module-2

3 a. Derive moment curvature equation for deflection. **(04 Marks)**

b. Determine the slope and deflection at free end of a cantilever beam subjected to point load 'W' at free end and of span 'L' with constant EI use Maculay's method. **(08 Marks)**

c. Using Conjugate beam method Determine the maximum deflection and slopes at support for a simply supported beam subjected to udl of w/m run over a span of L m with constant EI. **(08 Marks)**

OR

4 a. Determine the slope at left support and deflection at mid span of simply supported beam subjected to the loads as shown in Fig.Q.4(a) by using Maculay's method take EI = 200MN-m^2. **(10 Marks)**

b. Determine the slope at A and deflection at mid span for the above beam shown in Fig.Q.4(b) by using moment area method EI = 200 MN-m^2. **(10 Marks)**

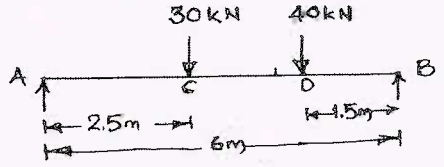


Fig.Q.4(b)

Module-3

5 a. Obtain an expression for strain energy stored in a member when it is subjected to bending moment. **(06 Marks)**

b. Find the deflection at C due to a point load acting as shown in Fig.Q.5(b) by using strain energy method. **(06 Marks)**

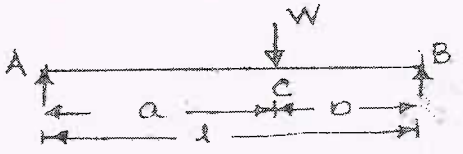
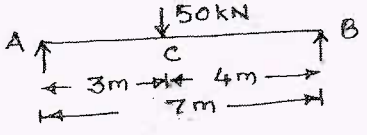


Fig.Q.5(b)

c. Find the deflection under the concentrated load for the beam shown in Fig.Q.5(c), by using Castiglino's theorem. Take E = 2 × 10^8 kN/m^2 and I = 14 × 10^{-6} m^4. **(08 Marks)**



OR

6 a. Determine the horizontal and vertical deflection at the free end of bracket shown in Fig.Q.6(a). **(10 Marks)**

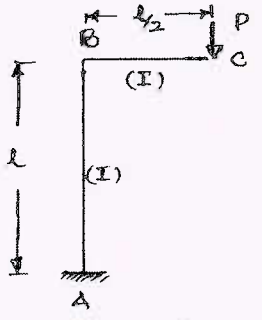


Fig.Q.6(a)

b. Determine the slope and deflection at free end of cantilever by using unit load method take $E = 2 \times 10^5$ N/mm^2 and $I = 12 \times 10^6$ mm^4 Refer Fig.Q.6(b). **(10 Marks)**

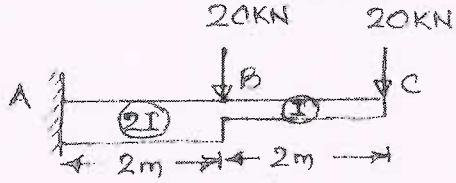


Fig.Q.6(b)

Module-4

7 a. A three hinged parabolic arch of span 20m and rise 4m carries a udl of 20kN/m run on the left half of the span find the maximum BM for the arch and also determine normal thrust and radial shear at a point 5m from left support. **(10 Marks)**

b. Show that the shape of cable is parabolic when the supports are at the same level and is subjected to udl of w force/unit length over the entire span also find the length of the cable. **(10 Marks)**

OR

8 a. A cable of span 20m and central 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) Length of cable iv) Horizontal and vertical forces transmitted on to the supporting pier if the cable passed over a smooth frictionless pulley. **(10 Marks)**

b. Show that the parabolic shape is a funicular shape for a three hinged arch subjected to udl over its entire span. **(10 Marks)**

Module-5

9 a. Define influence line diagram, what are the uses of ILD? **(04 Marks)**

b. A simple girder of 20m span is traversed by a moving udl of length 6m with an intensity of 20kN/m from left to right. Find the maximum bending moment and maximum positive and negative shear force at section 4m from left support also find the absolute maximum bending moment that may occur any where in the girder. [Ref.Fig.Q.9(b)] **(16 Marks)**

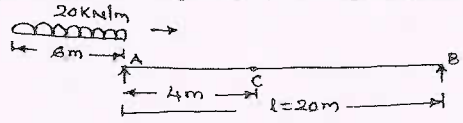


Fig.Q.9(b)

OR

10 a. Draw the unit load influence line diagrams for the reactions at supports of a simply supported beam. **(04 Marks)**

b. A simply supported beam shown in Fig.Q.10(b) is subjected a set of four concentrated loads which move from left to right. Determine: i) Maximum bending moment and shear force at a section of 6m from left support ii) Absolute maximum shear force and absolute maximum bending moment. Use influence line principle. **(16 Marks)**

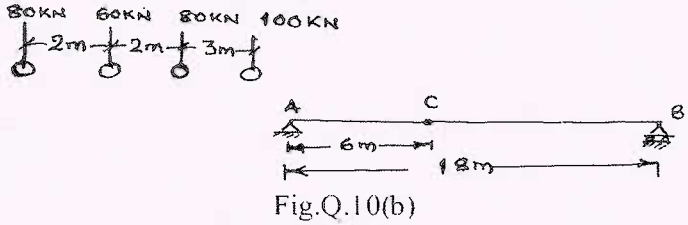


Fig.Q.10(b)

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17CV43

Fourth Semester B.E. Degree Examination, June/July 2019
Applied Hydraulics

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain Dimensionally Homogeneous equation. Give any two examples. **(10 Marks)**

b. 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 head causing flow, μ is coefficient viscosity, ρ = mass density and g = gravitational acceleration. **(10 Marks)**

OR

2 a. Derive an expression for kinematic and dynamic similarities. **(04 Marks)**

b. In the model test of a spillway the discharge and velocity of flow over the model were $2m^3/s$ and 1.53 m/s respectively. Calculate the velocity and discharge over the prototype which is 36 times the model size. **(08 Marks)**

c. A solid cylinder 2m in diameter and 2m high is floating in water with its axis vertical. If the specific gravity of the material of cylinder is 0.65, find its metacentric height. State also whether the equilibrium is stable or unstable. **(08 Marks)**

Module-2

3 a. Explain various types of flows in channel. **(10 Marks)**

b. A canal of trapezoidal section has bed width of 8m and bed slope of 1 in 4000. If the depth of flow is 2.4m and side slopes of the channel are 1H to 3V, then determine the average velocity and the discharge carried by the channel. Also compute the average shear stress at the channel boundary. Take C = 56. **(10 Marks)**

OR

4 a. Obtain the conditions of most economical trapezoidal section in which side slope is constant. **(10 Marks)**

b. A 8m wide channel conveys $15m^3/s$ of water at a depth of 1.2m. Obtain the following :
i) Specific energy of the flowing water.
ii) Critical depth, Critical velocity and minimum specific energy.
iii) Froude number and state whether flow is subcritical or supercritical. **(10 Marks)**

Module-3

5 a. Derive an expression for loss of energy head for hydraulic jump. **(10 Marks)**

b. In a rectangular channel of 0.5m width, a hydraulic jump occurs at a point where depth of water flow is 0.15m and Froude number is 2.5 obtain the following :
i) Sp. Energy ii) Critical and subsequent depths iii) Loss of head and iv) Energy dissipated. **(10 Marks)**

OR

6 a. Derive an expression for length of Back water curve. **(10 Marks)**

b. In a rectangular channel of width 24m and depth of flow 6m, the rate of flow of water is 86.4 m^3/S. If the bed slope of the channel is 1 in 4000 then find the slope of the free surface of water. Take C = 60. **(10 Marks)**

Module-4

7 a. Derive an expression for impulse momentum equation. **(05 Marks)**

b. Derive an expression for thrust exerted by the jet strikes a stationary curved vane at one end tangentially when the vane is symmetrical. **(07 Marks)**

c. A jet of water from a nozzle is deflected through 60^0 from its original direction by curved vane which enters tangentially without shock with a velocity of 30m/s and leaves with a mean velocity of 25m/s. If the mass issued from nozzle per second is 0.8 kg/s, calculate the magnitude and direction of the resultant force on the vane, if the vane is stationary. **(08 Marks)**

OR

8 a. Explain classification and efficiencies of turbines. **(10 Marks)**

b. A pelton wheel is to be designed for the following specifications :
Shaft power = 11,772 kW ; Head = 380m ; Speed = 750 r.p.m ; Overall efficiency = 86%
Jet diameter is not to exceed one – sixth of the wheel diameter. Determine
i) Wheel diameter ii) No. of jets required iii) Diameter of the jet.
Take $K_{V_1} = 0.985$ and $K_{u_1} = 0.45$. **(10 Marks)**

Module-5

9 a. With the help of neat sketches, explain Franci's inward flow reaction turbine. **(10 Marks)**

b. Calculate the diameter and speed of the runner of a Kaplan turbine developing 6000 kW under an effective head of 5m. Overall efficiency of the turbine is 90%. The diameter of boss is 0.4 times the external diameter of the runner. The turbine speed ratio is 2.0 and flow ratio 0.6. What is the specific speed of the turbine? **(10 Marks)**

OR

10 a. Explain with neat sketches, components and working of a centrifugal pump. **(10 Marks)**

b. A centrifugal pump impeller runs at 80 r.p.m and has outlet vane angle of 60°. The velocity of flow is 2.5m/s throughout and diameter of impeller at exit is twice that at inlet. If the manometric head is 20m and the manometric efficiency is 75%, determine
i) The diameter of impeller at the exit ii) Inlet vane angle. **(10 Marks)**

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17CV/CT44

Fourth Semester B.E. Degree Examination, June/July 2019
Concrete Technology

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. Explain the constituents of cement with their percentage and functions. **(10 Marks)**

b. Define Fineness modulus. Explain test procedure to determine the Fineness modulus and Importance of Fineness modulus. **(10 Marks)**

OR

2 a. What are Bogue's compounds? Briefly explain their contribution towards gaining of strength of cement with graph. **(10 Marks)**

b. What is an Admixture? What are the effects of air entrainment and Retarders on the properties of concrete? **(10 Marks)**

Module-2

3 a. Define Workability. Briefly explain the factors which affects the workability of concrete. **(10 Marks)**

b. What is the Importance of curing in concrete? Briefly discuss any two methods. **(10 Marks)**

OR

4 a. Mention the various stages of manufacturing of concrete. Discuss any two stages. **(10 Marks)**

b. Explain good and bad practices of making and using fresh concrete. **(10 Marks)**

Module-3

5 a. Explain the factors affects the strength of concrete. **(10 Marks)**

b. Write short notes on : i) Shrinkage of concrete ii) Creep. **(10 Marks)**

OR

6 a. What is durability of concrete? Explain the factors affecting the durability of concrete. **(10 Marks)**

b. Mention various non – destructive testing of concrete. Explain any two methods in brief. **(10 Marks)**

Module-4

7 Design a concrete mix for M_{25}.

a. Grade designation : M_{25}.
b. Type of cement : OPC 43 grade
c. Max. Nominal size of aggregates 20mm down
d. Min. cement content : 300 kg/m^3
e. Water cement ratio : 0.50
f. Workability : 75mm slap
g. Exposure condition : Moderate (RCC)
h. Method of concrete placing : Manual
i. Max. cement content : 450 kg/m^3
j. Chemical admixture : NIL
k. Fine aggregate zone : Zone 2.

A Cement : Type of cement = OPC 43 grade
Specific gravity : 3.15

B Coarse Aggregate : Specific gravity : 2.80
Water absorption : 1%
Free surface moisture : NIL

C Fine Aggregate : Specific gravity : 2.65
Water absorption : 2%
Free surface moisture : 2%

D Chemical Admixture – NIL. **(20 Marks)**

OR

8 Discuss the concept of mix design. Write step by step procedure for mix design using IS code. Also discuss the variables in proportioning of concrete. **(20 Marks)**

Module-5

9 a. What are requirements of RMC according QCI? Briefly discuss advantages and disadvantages of RMC. **(10 Marks)**

b. What is Light weight concrete? Discuss the uses and advantages of Light weigh concrete. **(10 Marks)**

OR

10 a. Enumerate the benefits of self compacting concrete. Explain any two test on self compacting concrete. **(10 Marks)**

b. List the types of Fibres used in FRC and discuss Factors affecting properties of FRC. **(10 Marks)**

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17CV45

Fourth Semester B.E. Degree Examination, June/July 2019
Basic Geotechnical Engineering

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. With the help of a three phase diagram, explain
i) Void ratio ii) Porosity iii) Water content iv) Degree of saturation. **(08 Marks)**

b. With usual notations, prove that
$e = \frac{WG}{Sr}$. **(06 Marks)**

c. Determine the Dry density , Void ratio, Porosity and degree of saturation. Given $\gamma_b = 26kN/m^3$, G = 2.67 and W = 16%. **(06 Marks)**

OR

2 a. Define Liquid limit, Plastic limit and Shrinkage limit. **(06 Marks)**

b. Explain the Indian Standard Soil classification system. **(08 Marks)**

c. A fine grained soil has a liquid limit of 54% and a plastic limit of 30%. Classify the soil as per IS classification. **(06 Marks)**

Module-2

3 a. Explain with sketches, the common clay minerals. **(08 Marks)**

b. Following are the results of a compaction test.

Weight of soil with mould (N)	29.25	30.95	31.50	31.25	30.70
Water Content (%)	10	12	14.3	16.1	18.2

Plot the compaction curve showing MDD and OMC. Given G = 2.70 , Volume of mould = 1000 cm^3. Weight of mould = 10N. **(12 Marks)**

OR

4 a. Explain Electrical Diffuse Double Layer. **(06 Marks)**

b. Distinguish between Standard proctor and Modified proctor compaction tests. **(04 Marks)**

c. For constructing an embankment, the soil is transported from a borrow area using a truck which can carry $6m^3$ of soil at a time. Determine the number of truck loads of soil required to obtain $100m^3$ of compacted earth fill and the volume of the borrow pit. Use the following details. **(10 Marks)**

Property	Borrow area	Truck loose	Field compacted	Soil Type
Bulk density (kN/m^3)	16.6	11.5	18.2	Well graded
Water content (%)	8	6	14%	-

Module-3

5 a. What is a Flow net? What are the uses and characteristics of flow nets? **(08 Marks)**

b. The porosity of a certain sample of sand was 50% in the loose state and 34% in the dense state. The specific gravity is 2.70. Estimate the critical hydraulic gradients in loose and dense states. **(06 Marks)**

c. Compute the quantity of water seeping under a weir per day for which the flow net has been satisfactorily constructed. The coefficient of permeability is 2×10^{-2} mm/s. $n_f = 5$ and $n_d = 18$. The difference in water level between upstream and downstream is 3.0m. The length of the weir is 60m. **(06 Marks)**

OR

6 a. With the help of neat sketches, derive an equation to determine permeability by the following Laboratory method and also state their suitability.
i) Constant Head Permeability Test ii) Falling Head Permeability Test. **(14 Marks)**

b. What are the factors affecting permeability? Explain them briefly. **(06 Marks)**

Module-4

7 a. Explain with neat sketch, the mass spring analogy. **(08 Marks)**

b. Explain normally consolidated soil and over consolidated soil. **(06 Marks)**

c. The thickness of a normally consolidated clay layer is 3.0m. The initial void ratio of the sample is 1.0 and its liquid limit is 60%. The overburden pressure at the middle of the clay layer was 154 kN/m^2. Due to construction of a building the increase in effective stress is 92.4kN/m^2. Determine the consolidation settlement of the clay layer. **(06 Marks)**

OR

8 a. Explain with a sketch, determination of Pre – consolidation pressure by Casagrande's method. **(06 Marks)**

b. Explain Square root of time fitting method. **(06 Marks)**

c. A 20m thick isotropic clay stratum overlies an impervious rock. The coefficient of consolidation of soil is 5×10^{-2} $mm^{2/s}$. Find the time required for 50% and 90% consolidation. Time factors are 0.2 and 0.85 for 50% and 90% consolidations respectively. **(08 Marks)**

Module-5

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

b. What are the factors affecting the shear strength of soil? **(06 Marks)**

c. In a shear test conducted on a river sand, the following results were obtained.

Normal Force (N)	80	160	240	320	400	480
Shear Force (N)	50	101	149	201	248	302

Determine 'e' and 'ϕ'. **(08 Marks)**

OR

10 a. With the help of neat sketches, derive an equation to determine shear strength by Vane shear test. **(08 Marks)**

b. In a triaxial test on two identical soil samples, the following data was obtained.

Test No.	Cell pressure (KN/m^2)	Maximum deviation stress (KN/m^2)	Maximum principal stress (KN/m^2)
1	50	120	-
2	100	-	332

Compute shear parameters. **(12 Marks)**

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CBCS SCHEME

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17CV46

Fourth Semester B.E. Degree Examination, June/July 2019
Advanced Surveying

Time: 3 hrs. Max. Marks: 100

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

Module-1

1 a. With the help of a neat sketch of a simple circular curve? Explain.
i) Tangent length ii) Length of long chord iii) Intersection angle
iv) Point of curve v) Point of tangency vi) Deflection angle. **(06 Marks)**

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

c. Two tangents intersect at a chainage (59 + 60), the deflection angle being 50° 30′. Calculate the necessary data for setting out a curve of 15 chains radius to connect the two tangents, if it is inteneded to set out the curve by Rankine's method of deflection angles. Take the peg interval equal to 100 links, the length of the chain being 20m (100 links). Draw the curve table. **(10 Marks)**

OR

2 a. What is transition curve? List the function and essential requirements of an ideal transition curve. **(06 Marks)**

b. Two straights BA and AC are intersected by a line EF. The angle BEF and EFC are 130° and 140° respectively. The radius of the first arc is 500m and that second arc 300m. Find the chainages of the tangent points and the points of compound curvature given that the chainage of the intersection point 'A' is 3200m. **(07 Marks)**

c. Two parallel railway lines are to be connected by a reverse curve. Each section having the same radius. If the lines are 12 meters apart and the maximum distance between tangent points measured parallel to the straights is 48meters, find the maximum allowable radius. If however, both the radii are to be different, calculate the radius of the second branch if that of the first branch is 60meters. Also, calculate the lengths of both the branches. **(07 Marks)**

Module-2

3 a. List the various factors that are to be considered in the selection of site for baseline and station in triangulation survey. **(06 Marks)**

b. Write a note on classification of triangulation system. **(06 Marks)**

c. From a satellite station 'S' which is 14m 'A', angles measured to 3 triangulations stations are as follows :
$\angle CSA = 32°45'48''$, $\angle BSC = 68°26'36''$ the length of sides, AC and AB are 5678m and 1441m respectively. Find the angle of BAC. **(08 Marks)**

OR

4 a. Explain the sources and kinds of errors. **(04 Marks)**

b. State and explain law of weights. **(08 Marks)**

c. Find the most probable values of ∠A and ∠B from the following observation @ a station '0'.
A = 9° 48′ 36″ ωt 2
B = 54° 37′ 48″ ωt 3
A +B = 104° 26′ 28″ ωt 4. **(08 Marks)**

Module-3

5 a. Define the following terms :
i) Zenith ii) Nadis ii) AZimuth iv) The altitude v) Celestial sphere. **(05 Marks)**

b. Mention the properties of a spherical triangle. **(05 Marks)**

c. Find the shortest distance between two points A and B, given :
A latitude —18° 24′ Nlongitude 36° 18′E
B latitude —68° 32′ Nlongitude 126° 34′E. **(10 Marks)**

OR

6 a. Define the following :
i) Latitude ii) Longitude iii) The visible HariZon iv) Sensible HoriZon. **(04 Marks)**

b. Explain Ecliptic and solstices. **(06 Marks)**

c. At a point 'A' in latitude 45°N, a straight line is ranged out which runs due east at A. This straight line is prolonged for 300 nautical miles to B. find the latitude of B, and if it be desired to travel due north from B. So as to meet the 45° parallel again at 'C', find the ABC at which we must set out and the distance BC. **(10 Marks)**

Module-4

7 a. Define the terms :
i) Picture plane ii) Camera axis iii) Focal length iv) Principal plane
v) Perspective projection vi) Film Base. **(06 Marks)**

b. With a neat sketch, derive the expression for the scale of a vertical photograph. **(06 Marks)**

c. A vertical photograph was taken at an altitude of 1200m above MSL. Determine the scale of the photograph for the terrain laying at elevation of 80m and 300m. If the focal length of the camera is 15cm. **(08 Marks)**

OR

8 a. Define the terms : i) Drift ii) crab iii) mosaics. **(06 Marks)**

b. Explain the procedure for aerial survey. **(06 Marks)**

c. The scale of an aerial photography is 1cm = 100m. The photograph size is 20cm × 20cm. determine the number of photography required to cover an area 10km × 10km, if the longitudinal lap is 60%and side lap is 30% **(08 Marks)**

Module-5

9 a. Define EDM **(04 Marks)**

b. Mention the advantages of total station and also discuss the working principles of the same. **(08 Marks)**

c. Define remote sensing. Explain the applications in civil engineering. **(08 Marks)**

OR

10 a. What are the advantages of LIDAR technology? **(04 Marks)**

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

c. What is GPS? Explain the basic principles of GPS and its application in surveying. **(08 Marks)**

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CBCS SCHEME

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15CV42

Fourth Semester B.E. Degree Examination, June/July 2019
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. With an example define statically determinate and statically indeterminate structure. **(04 marks)**

b. Determine the force in each member of the roof truss shown in Fig.Q1(b) by method of joints. **(12 Marks)**

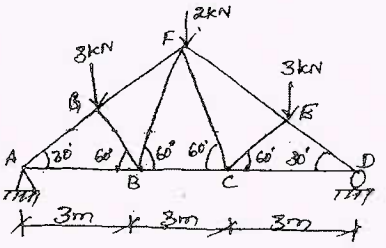

Fig.Q1(b)

OR

2 a. Define : i) Conditions of equilibrium ii) Degree of freedom iii) Assumptions in truss analysis. **(06 Marks)**

b. Determine the force in members CB and GC and state whether the members are in tension or compression Fig.Q2(b). Adopt method of section. **(10 Marks)**

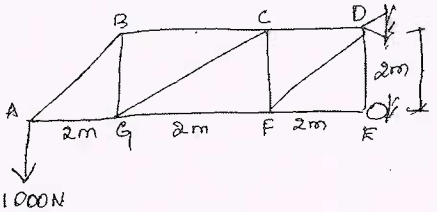

Fig.Q2(b)

Module-2

3 a. Determine the slope @ point 'C' of the beam in Fig.3(a) by moment area method. E = 200GPa, I = $6(10^6)mm^4$. **(08 Marks)**

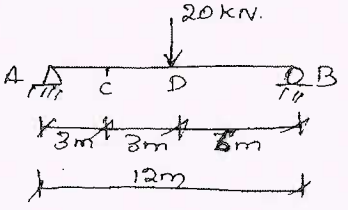

Fig.Q3(a)

b. By double integration method, determine slope and deflection at A for the beam shown in Fig.Q3(b). **(08 Marks)**

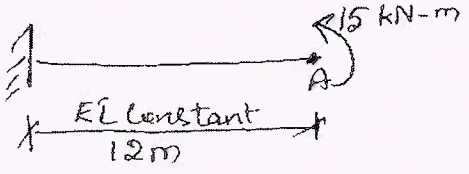

Fig.Q3(b)

OR

4 a. Using conjugate beam method, determine the slope and deflection @ point B of the beam shown in Fig. 4(a). EI is constant. **(08 Marks)**

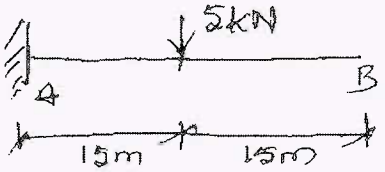

Fig.Q4(a)

b. Using Machaulay's method of deflection, calculate the deflection under two loads and maximum deflection for the beam shown in Fig.Q4(b). **(08 Marks)**

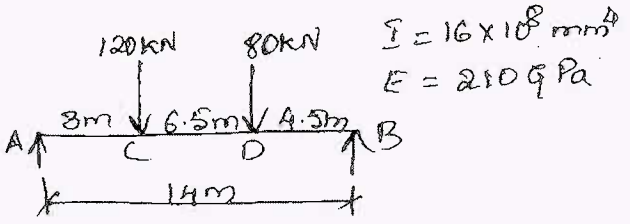

Fig.Q4(b)

Module-3

5 a. Explain the principles of virtual displacement and forces. **(06 marks)**

b. Using Castigliano's theorems, determine the vertical displacement of joint C of the truss shown in Fig.Q5(b). A = 400mm^2, E = 200GPa. **(10 Marks)**

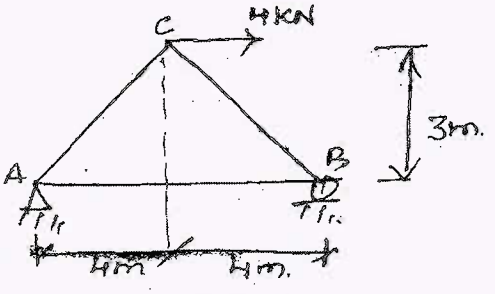

Fig.Q5(b)

OR

6 a. Derive strain energy in an axially loaded member. **(06 marks)**

b. A beam AB is simply supported over a span 5m in length. A concentrated load of 30kN is acting at a section 1.25m from left support A. Calculate the deflection under the load point using dummy unit load method. E = 200 × 10^{6}kN/m^2 I = 13 × 10 ^{6}m^4. **(10 Marks)**

Module-4

7 a. A footbridge of width 3m and span 50m is carried by 2 cables of uniform section having a central dip of 5m. If the platform load is 5kN/m^2. Calculate the maximum pull in the cables. Find the necessary section area required if the allowable stress is 120N/mm^2. **(10 Marks)**

b. Derive the expression for the length of cable for supports at same levels. **(06 Marks)**

OR

8 A 3–hinged parabolic arch has span 16m and central rise 4m. It carries a point load of 100kN @ 4m from left support. Evaluate reaction components, moment, thrust and radial shear at a section 6m from left support. Take the equation of arch $y = 4h\, x(\ell - x)$ with left hand support as origin. Draw BMD. **(16 Marks)**

Module-5

9 a. a udl of 15kN/m covering a length of 3m crosses a girder of span 10m – find the max, shear force and bending moment at a section 4m from left support. **(08 Marks)**

b. Define influence line and its significance. **(08 Marks)**

OR

10 Determine maximum moment and shear force at point C shown in Fig.Q10. The loading is due to axle loads of IRC class A driving vehicle on top of the beam. Assume that the vehicle can move in either direction. **(16 Marks)**

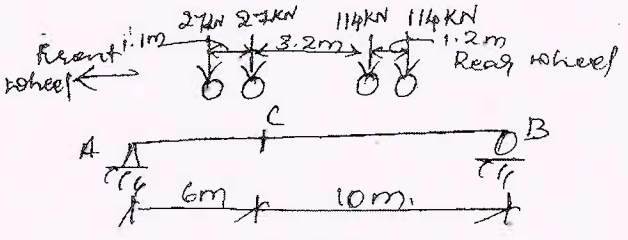

Fig.Q10

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CBCS SCHEME

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15CV43

Fourth Semester B.E. Degree Examination, June/July 2019
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. State and prove the Buckingham π-Theorem. Also explain its advantages over Rayleigh's method of dimensional analysis. **(05 Marks)**

b. A ship 300m long moves in 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 30 m/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 given as 1.24 kg/m^3. Take the kinematic viscosity of sea-water and air as 0.012 strokes and 0.018 strokes respectively. **(08 Marks)**

c. Define: Buoyancy, Metacentre Metacentric height. **(03 Marks)**

OR

2 a. Explain the Froude model law. Derive the different scale ratio for Froude model law. **(08 Marks)**

b. Derive on the basis of dimensional analysis suitable parameters to present the thrust developed by a propeller. Assume that the thrust P depends upon the angular velocity W speed of advance V, diameter D, dynamic viscosity μ, mass density ρ, elasticity of the fluid medium which can be denoted by the speed of sound in the medium C. **(08 Marks)**

Module-2

3 a. Prove that for a channel of circular section the depth of flow d = 0.81D for maximum velocity. Where D = Diameter of circular channel, d = depth of flow. **(08 Marks)**

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

i) Specific energy of the flowing water
ii) Critical depth and critical velocity
iii) Value of maximum specific energy. **(08 Marks)**

OR

4 a. Explain specific energy curve, and thus derive expression for critical depth and critical velocity. **(08 Marks)**

b. An open channel of most economical section, having the form of a half hexagon with horizontal bottom is required to give a maximum discharge of 20.2 m^3/s of water. The slope of the channel bottom is 1 in 2500. Taking Chezy's constant C = 60 in Chezy's equation, determine the dimensions of the cross-section. **(08 Marks)**

Module-3

5 a. Define the term hydraulic jump. Derive an expression for depth of hydraulic jump in terms of u/s Froude's number. **(08 Marks)**

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

OR

6 a. Derive an expression for the length of Back water curve **(08 Marks)**

b. A sluice gate discharge water in to a horizontal rectangular channel with a velocity of 6m/s and depth of flow is 0.4m. The width of the channel is 8m. Determine whether a hydraulic jump will occur and if so. Find its height and loss of energy per kg of water. Also determine the power lost in the hydraulic jump. **(08 Marks)**

Module-4

7 a. Derive an equation for the force existed by a jet of water on a fixed curved plate in the direction of the jet when the jet strikes at the centre of the plate. Hence show that the force exerted on semi circular plate is two times the force exerted by the jet on an fixed vertical plane plate. **(08 Marks)**

b. A pelton wheel is having a mean bucket diameter of 1m and is running at 999.9 rpm. The net head on the pelton wheel is 699m. If the side clearance angle is 15° and discharges through nozzle is $0.1m^3/s$ find:

i) Power available at the nozzle

ii) Hydraulic efficiency of the turbine. **(08 Marks)**

OR

8 a. A jet of water of diameter 50mm, having a velocity of 20 m/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 of 60° to the direction of motion of vane at outlet.
Determine:

i) The force exerted by the jet on the vane in the direction of motion.

ii) Work done per second by the jet. **(08 Marks)**

b. What do you mean by gross had, net Head and efficiency of turbine? Explain the different types of the efficiency of a turbine. **(08 Marks)**

Module-5

9 a. Define draft tube. What are the different types of draft tube? Explain draft tube theory and its efficiency. **(08 Marks)**

b. A centrifugal pump is to discharge $0.118\ m^3/sec$ a speed of 1450 rpm against a head of 25m. The impeller diameter is 250mm. Its width at outlet is 50mm and manometric efficiency is 75% Determine the vane angle at the outer periphery of the impeller. **(08 Marks)**

OR

10 a. Define specific speed of a centrifugal pump. Derive an expression for the same. **(08 Marks)**

b. A Kaplan turbine develops 24647.6 kW power at an average head of 39m. Assuming a speed ratio of 2. Flow ratio of 0.6, diameter of the boss equal to 0.35 times the diameter of the runner and an overall efficiency of 90% Calculate the diameter, speed and specific speed of the turbine. **(08 Marks)**

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CBCS SCHEME

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15CV45

Fourth Semester B.E. Degree Examination, June/July 2019
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.*
3. *Use of Plasticity chart allowed 1498-1970.*

Module-1

1 a. With the help of three phase diagram, explain i) Void ratio ii) Porosity iii) Degree of saturation iv) Water content v) Submerged unit weight vi) Specific gravity. **(08 Marks)**

b. The following data were obtained in a shrinkage limit test :
Initial weight of saturated soil = 0.956N ; Initial volume of saturated soil = 6.85×10^{-5} m^3
Final dry volume = $2.41 \times 10^{-5} m^3$; Final dry weight = 0.435N.
Determine the shrinkage limit , initial bulk , unit weight , dry unit weight , specific gravity of soil solids, initial and final void ratios. **(08 Marks)**

OR

2 a. Explain IS classification system for coarse and fine grained soils as per 1498 – 1970. Use plasticity chart at the appropriate level. **(08 Marks)**

b. In an earthen embankment under construction the bulk unit weight is 16.50kN/m^3 at water content 11%. If the water content has to be increased to 15% , compute the quantity of water to be added per cubic meter of soil. Assuming no change in void ratio, determine the degree of saturation at this water content by taking G = 2.70. **(08 Marks)**

Module-2

3 a. With relevant sketches, explain the following : i) Single grained structure ii) Honey combed structure iii) Floccullant structure iv) Dispersed structure. **(08 Marks)**

b. Following are the observations of a compaction test :

Water content (%)	7.7	11.5	14.6	17.5	19.5	21.2
Weight of wet soil (N)	16.67	18.54	19.92	19.52	19.23	18.83

If the compaction mould is 950CC and by assuming G = 2.65.
i) Draw the compaction curve.
ii) Report the optimum moisture content and maximum dry unit weight.
iii) Draw 100% saturation line. **(08 Marks)**

OR

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

b. Laboratory compaction test on soil having specific gravity of 2.7 gave a maximum dry unit weight of 18kN/m^3 and a water content of 15%. Determine the degree of saturation , air content and percentage air void 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 the following : i) Effective stress concept ii) Seepage and superficial velocity iii) Quick sand condition iv) Capillary rise of water in soil. **(08 Marks)**

b. A soil stratum with permeability K = 5×10^{-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 the quantity of seepage. **(08 Marks)**

OR

6 a. Describe the Casagrande's method to locate the phreatic line in a homogeneous earth dam with a horizontal filter at its toe. **(08 Marks)**

b. In a falling head permeability test, the soil sample used is 20cm long with a cross – sectional area 24cm^2. Calculate the time required for the head causing flow to drop from 250mm to 120mm. The area of cross – section of the stand pipe is 2cm^2. The soil sample is made up of 3 layers. The thickness of first layer from the top is 8cm and has a value of K as 2×10^{-4} cm/s. The second layer has thickness of 7cm and it has K = 5×10^{-4}cm/s. The bottom most layer has a K value of 7×10^{-4} cm/s. Flow is in a direction perpendicular to the layers. **(08 Marks)**

Module-4

7 a. Explain Mass – spring anology theory of consolidation of soil. **(08 Marks)**

b. A clay soil, tested in a consolidometer , showed a decrease in void ratio from 1.20 to 1.10 when the pressure was increased from 0.25 to 0.50 Kgf/cm^2. Calculate the coefficient of compressibility (a_v) and the coefficient of volume compressibility (m_v). If the coefficient of consolidation (C_v) determined in the test for the given stress increment was 10m^2/year, calculate the coefficient of permeability in cm/s. **(08 Marks)**

OR

8 a. With the help of neat sketch , explain determination of preconsolidation pressure by Casagrande's method. **(04 Marks)**

b. Briefly explain normally consolidated, under consolidation and over consolidated soils. **(06 Marks)**

c. Following data were obtained from a consolidation test on a clay sample with double drainage conditions : Void ratio at 100 KPa = 1.37 ; Void ratio at 200 KPa = 1.25. Thickness of the soil sample at 100 KPa = 20mm ;
Coefficient of permeability = 5×10^{-7} mm/s. Calculate i) Compression index
ii) Coefficient of volume change iii) Coefficient of consolidation in mm^2/year. **(06 Marks)**

Module-5

9 a. List the various test to determine shear strength parameters of soil and explain briefly any one method. **(06 Marks)**

b. In a direct shear test conducted on a dense sand, the sample fails at a shear stress of 75 kN/m^2, when the normal stress was held constant at 100kN/m^2. Draw the Mohr circle for the failure condition and determine i) the angle of shearing resistance ii) the orientation of the major and minor principal planes and the stress acting on them iii) the orientation of the plane of maximum shear stress. If a specimen of this soil were to be tested in a triaxial shear test under CD condition at a cell pressure of 125kN/m^2, at what axial stress would the sample fail? **(10 Marks)**

OR

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

b. An unconfined compression test was conducted on an undisturbed sample of clay. The sample had a diameter of 37.5mm and was 80mm long. The load at failure measured by the proving ring was 28N and the axial deformation of the sample at failure was 13mm. Determine the unconfined compressive strength and the undrained shear strength of the clay. **(10 Marks)**

CBCS SCHEME

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15CV46

Fourth Semester B.E. Degree Examination, June/July 2019
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. Derive relationship between Radius and Degree of the curve. Draw Reverse curve for parallel straights and label the parts. **(08 Marks)**

b. Two tangents intersect at chainage of 59 + 60, the deflection angle being 50°30′. Calculate the necessary data for setting out a curve of 300 m radius to connect the two tangents by the offset from chords produced method with peg interval of 20 m. The chain is of 20 m length. **(08 Marks)**

OR

2 a. Give the requirement of transition curves on highways and why are vertical curves provided on highways? **(08 Marks)**

b. A Road bend deflects 80° and is to be designed for a maximum speed 100 kmph and centrifugal ration = 1/4. The maximum rate of change of acceleration = 30 cm/cubic.sec. The curve consists of a circular are combined with two spirals. Calculate the radius of the circular curve, length of the transition curve, total length of the combined curve, chainages of beginning and end of transition curve and junction of transition curves with circular curve? Chainage of point of intersection = 42862 m. **(08 Marks)**

Module-2

3 a. Briefly discuss on the classification of triangulation system with figures. **(08 Marks)**

b. Directions are observed from eccentric station S at 62.18m from station C. The following were the results $\hat{A} = 0°0'0''$, $\hat{B} = 21°54'32''$, $\hat{C} = 296°12'2''$, AC = 8240.6 m, BC = 10863.6m, obtain the angle $A\hat{C}B$? **(08 Marks)**

OR

4 a. What are probable errors, most probable value and normal equations? What is spherical excess? **(08 Marks)**

b. The following are the observation data:

$\hat{A} = 45°30'10''$ of weight 2

$\hat{B} = 40°20'20''$ of weight 3

$\hat{A} + \hat{B} = 85°50'10''$ of weight 1

Find most probable values of $\hat{A}$ and $\hat{B}$? **(08 Marks)**

Module-3

5 a. With sketches define the following:

i) Declination of star and hour angle

ii) Altitude of star and Azimuth **(08 Marks)**

b. Determine the azimuth and altitude of a star from the following data. Latitude of the observer = 48°, Hour angle of the star = 43 degrees, Declination of star = 18°20′ N. **(08 Marks)**

OR

6 a. What is Astronomical triangle? State the Napier's rule for solving the astronomical triangle? **(08 Marks)**

b. A star has a declination of 50°15′, its upper culmination is in the Zenith of the place. Find the altitude of the star at lower culmination. **(08 Marks)**

Module-4

7 a. State the different applications of photogrammetry. Derive equation for relief displacement in vertical aerial photograph. **(08 Marks)**

b. Two points A and B having elevations of 500 m and 300 m respectively above the datum appear in vertical photograph of focal length = 20 cms and flying height of the aircraft = 2500 m above the datum, their corrected coordinates are as follows:

Point	Photographic Coordinates	
	x (cms)	y (cms)
a	+2.65	+1.36
b	−1.92	+3.65

Determine the length of AB? **(08 Marks)**

OR

8 a. Briefly discuss on the procedure for carrying out the aerial survey to acquire the pictures of the specified area. **(08 Marks)**

b. The scale of the aerial photo is 1 cm = 100 m, the size of photo = 20cms × 20 cms. Determine number of photographs required to cover an area of 100 km^2 for the specified overlaps. **(08 Marks)**

Module-5

9 a. How is distance measurement carried out using EDM? **(05 Marks)**

b. Write a note on image interpretation technique. **(05 Marks)**

c. Briefly bring out the process on differential positioning in GPS. **(06 Marks)**

OR

10 a. Explain the components of GIS. **(08 Marks)**

b. What are the applications of total station? **(04 Marks)**

c. Briefly discuss on the different applications of GIS in civil engineering. **(04 Marks)**

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