CBCS Scheme

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15CV/CT32

Third Semester B.E. Degree Examination, Dec.2016/Jan.2017
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. Name and define the four elastic constants. **(06 Marks)**

b. Determine the value of "P" and the total deformation of the stepped bar. Take E = 2.1 × 10^5 N/mm^2. Refer fig.Q1(b). **(10 Marks)**

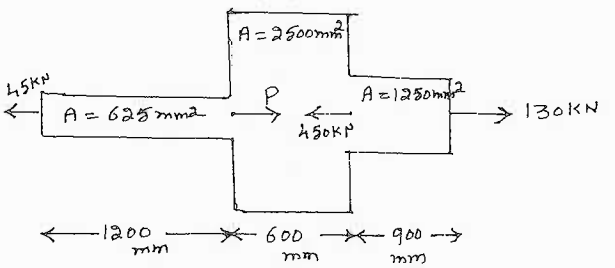


Fig.Q1(b)

OR

2 a. Derive the relationship between Young's modulus and bulk modulus. **(06 Marks)**

b. A steel bar is placed between two copper bars, each having same area and length as the steel bar. These are rigidly connected together at a temperature of 25^0C. When the temperature is raised to 325^0C, the length of the bar is increased by 1.5mm. Compute the original length and final stresses in each bar. Take E_{steel} = 210GPa and E_{copper} = 100GPa ; α_{steel} = 12 × $10^{-6}/^0$C and α_{copper} = 17.5 × $10^{-6}/^0$C. **(10 Marks)**

Module-2

3 a. Explain the procedure to construct Mohr's circle and to find principal stresses and their planes. **(04 Marks)**

b. The stresses acting at a point in a two dimensional stress system is as shown in fig.Q3(b). Determine : i) Principal stresses ii) Normal and tangential stress on the plane AB iii) Maximum shear stress. **(12 Marks)**

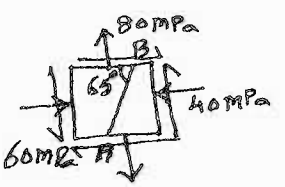


Fig.Q3(b)

OR

4 a. Derive an expression for hoop stress in thin cylinder. **(04 Marks)**

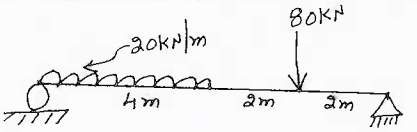
b. Find the thickness of the metal necessary for a steel cylindrical shell of internal dia 150mm to withstand an internal pressure of 50N/mm^2. The maximum hoop stress in the section not to exceed 150N/mm^2. If the thickness is found using the cylinder analysis, what is the percentage error? **(12 Marks)**

Module-3

5 a. Derive the relationship between intensity of load, shear force and bending moment. **(06 Marks)**

b. Draw shear force and bending moment diagrams for the beam shown in fig.Q5(b). **(10 Marks)**

Fig.Q5(b)

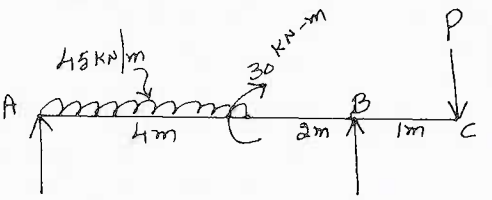


OR

6 a. Define i) Shear force ii) Bending moment and iii) Point of contra flexure. **(03 Marks)**

b. For the beam AC shown in fig.Q6(b), determine the magnitude of the load 'P' acting at C, such that the reaction at supports A and B are equal. Also draw SF and BM diagrams, locate the point of contra flexure if any. **(13 Marks)**

Fig.Q6(b)

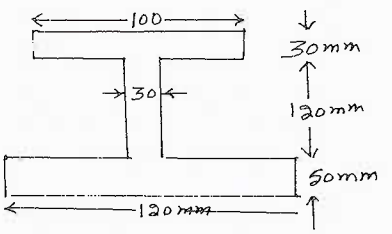


Module-4

7 a. What are the assumptions in bending theory? **(04 Marks)**

b. A beam simply supported at ends and having cross section as shown in fig.Q7(b) is loaded with a udl over a span of 8m. The allowable bending stress in tension is 30N/mm^2 and that in compression is 45N/mm^2. Determine the maximum value of udl, the beam can carry. **(12 Marks)**

Fig.Q7(b)



OR

8 a. Differentiate between short and long columns. **(04 Marks)**

b. What are the limitations of Euler's theory? **(04 Marks)**

c. A column 6m long has both of its ends fixed and has a timber section of 150mm × 200mm. Determine the crippling load on the column. Take E = 17.5 × 10^3 N/mm^2. **(08 Marks)**

Module-5

9 a. Derive the torsion equation with usual notations. **(08 Marks)**

b. A hollow shaft of external dia 120mm transmits 300KW power at 200rpm. Determine the maximum internal dia. if the maximum shear stress in the shaft is not to exceed 60N/mm^2. **(08 Marks)**

OR

10 a. Explain Maximum Principal Stress theory. **(04 Marks)**

b. A solid circular shaft is subjected to a bending moment of 9000N-m and a twisting moment of 12000 N-m. In a simple uniaxial tensile test of the same material, it gave the following particulars : Stress at yield point = 300N/mm^2 ; E = 200GN/mm^2.
Estimate the least dia required using i) Maximum principal stress theory ii) Maximum shear stress theory. Take FOS = 3 and μ = 0.25. **(12 Marks)**

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CBCS Scheme

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15CV33

Third Semester B.E. Degree Examination, Dec.2016/Jan.2017
Fluid Mechanics

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. State Newton's law of viscosity and derive the expression. **(04 Marks)**

b. Derive an expression for pressure inside a liquid droplet. **(04 Marks)**

c. Petrol of specific gravity 0.8 flows up through a vertical pipe. A and B are the two points in the pipe, B being 0.3m higher than A. A and B are connected to a u-tube differential manometer containing mercury. If the pressure difference between A and B is 18kPa, find the mercury difference in manometer. **(08 Marks)**

OR

2 a. Distinguish between: i) Simple manometer and differential manometer; ii) Absolute pressure and gauge pressure; iii) Newtonian and non-Newtonian fluids. **(06 Marks)**

b. At a certain point in a fluid the shear stress is 0.216 Pa and the velocity gradient is 0.216/s. If specific gravity of fluid is 0.9, what is the kinematic viscosity? **(04 Marks)**

c. A cube of 0.3m sides and weight 30N slides down an inclined plane sloped at 30° to the horizontal. The plane is covered by an oil of $\mu = 2.3 \times 10^{-3}$ Pas with 0.03mm thickness. Determine the velocity with which the cube slides down. **(06 Marks)**

Module-2

3 a. Derive an expression for total pressure and center of pressure on a vertically immersed plane surface. **(08 Marks)**

b. In a 2D incompressible flow the velocity components are given by $u = x - 4y$ and $v = -y - 4x$. Show that velocity potential exists and determine it. Also find the corresponding stream function. **(08 Marks)**

OR

4 a. A vertical gate closes a circular tunnel of 5m diameter running full of water. The pressure at the bottom of the gate is 1MPa. Determine the hydrostatic pressure force and position of CP on the gate. **(08 Marks)**

b. Explain:
i) Steady and unsteady flows
ii) Streamline and path line
iii) Flownet
iv) Rotational and irrotational flow. **(08 Marks)**

Module-3

5 a. Derive the Bernoulli's equation of motion along the stream tube. **(08 Marks)**

b. A horizontal venturimeter 200mm × 100mm is used to measure the flow of water in a pipe. The pressure at inlet is 17.658N/cm^2 and vacuum pressure at throat is 30cm of mercury. Find the flow rate through the venturimeter if $C_d = 0.98$. **(08 Marks)**

OR

6 a. A cylindrical vessel open at the top is 1m long and 150mm in diameter. It contains water upto a height of 0.8m. The vessel is rotated at 300rpm. Find the depth of parabola formed at the free surface. Also find the maximum speed at which the vessel is to be rotated so that no water spills. **(08 Marks)**

b. A pipe line carrying oil of specific gravity 0.8 changes in diameter from 300mm diameter at position A to 500mm diameter at B which is 5m higher than A. If the pressure at A and B are respectively 20N/cm^2 and 15N/cm^2 and discharge is 150 lps, determine the loss of head and direction of flow. **(08 Marks)**

Module-4

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

b. Define C_v, C_c and C_d for an orifice. **(03 Marks)**

c. Explain types of nappe. **(05 Marks)**

OR

8 a. Water is flowing in a rectangular channel 1m wide and 0.75m deep. Find the discharge over a rectangular weir of 0.6m crest length. The head over the crest is 200mm, C_d = 0.62. Take velocity of approach into consideration and neglect end contraction. **(08 Marks)**

b. Differentiate between: i) Notch and weir; ii) Orifice and mouthpiece. **(04 Marks)**

c. A jet of water issuing from a 25cm diameter orifice under a constant head of 1.5m moves 0.915m vertically before it strikes ground at a distance of 2.288m measured horizontally from the vena-contracta. The discharge was found to be 102 lpm. Calculate C_d, C_v, C_c. **(04 Marks)**

Module-5

9 a. Derive Darcy's equation for head loss through a pipe. **(08 Marks)**

b. Water flowing through a rigid pipe of diameter 500mm with 1.5m/s is suddenly brought to rest. Find the instantaneous pressure rise if K_{water} = 2GPa. **(02 Marks)**

c. A compound pipe system consists of 1800m of 0.5m diameter, 1200m of 0.4m diameter and 600m of 0.3m diameter connected in series. Convert the system to,

i) An equivalent length of 0.4m diameter.

ii) An equivalent pipe of 3600m length. **(06 Marks)**

OR

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

b. Explain:

i) Hardy-cross method.

ii) Head loss due to sudden expansion. **(08 Marks)**

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CBCS Scheme

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15CV34

Third Semester B.E. Degree Examination, Dec.2016/Jan.2017
Basic Surveying

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define surveying. Enumerate the applications of surveying. **(08 Marks)**

b. A chain was tested before starting the survey and was found to be exactly 20m. At the end of the survey, it was tested again and was found to be 20.12m. Area of the plan of the field drawn to a scale of 1cm = 6m was 50.4cm^2. Find the true area of the field in Sq.m. **(08 Marks)**

OR

2 a. Define Ranging. Explain indirect or reciprocal ranging with sketch. **(08 Marks)**

b. Two stations P and Q on the main survey line were taken on the opposite sides of a pond. On the right of PQ a line PR, 210m long was laid down and another line PS, 260m long was laid down on the left of PQ. The points RQ and QS are 85m and 75m respectively. Compute the length of PQ. **(08 Marks)**

Module-2

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

b. The following bearings were observed while traversing with a compass

Line	FB	BB
AB	45°45′	226°10′
BC	96°55′	277°05′
CD	29°45′	209°10′
DE	324°48′	144°48′

Mention which stations were affected by local attraction and determine the corrected bearing. **(10 Marks)**

OR

4 a. Enumerate the applications of Theodolite **(06 Marks)**

b. Explain the repetition method of measuring the horizontal angle using Transit Theodolite and errors eliminated by that method. **(10 Marks)**

Module-3

5 a. What is meant by balancing of Traverse? Explain the Bowditch method of adjusting the traverse. **(08 Marks)**

b. In a closed traverse ABCDE, the length and bearings of EA has been omitted. Compute the length and bearing of the line EA. **(08 Marks)**

Line	Length (m)	Bearing
AB	204	87°30′
BC	226	20°20′
CD	187	280°0′
DE	192	210°3′
EA	?	?

OR

6 a. Derive the distance and elevation formulae for stadia tachometry, when the staff is held vertical and the line of sight being inclined upwards and downwards. **(06 Marks)**

b. To determine the gradient between two points A and B a tachometer was set up at another station 'C' and the following observations were made, keeping the staff vertical.

Staff at	Vertical angle	Staff reading (m)
A	+4°20′00″	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 average gradient between A and B, K = 100, C = 0.0. **(10 Marks)**

Module-4

7 a. Enumerate the errors in Levelling. **(06 Marks)**

b. The following staff readings were observed successively with level, the instrument having 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 on a BM of elevation 132.135m. Enter the readings in a level book format and reduce the levels. Apply the usual checks. **(10 Marks)**

OR

8 a. Define sensitiveness of bubble tube. Describe the field procedure to determine the sensitiveness of bubble tube. **(06 Marks)**

b. Find the elevation of the top of the chimney from the following data :

Inst Station	Reading on BM (m)	Angle of elevation	Remarks
A	0.865	18°36′	RL of BM = 421.380m
B	1.225	10°12′	Distance AB = 50m

Stations A, B and top of chimney are in the same vertical plane. Station 'A' is nearer to the chimney. **(10 Marks)**

Module-5

9 a. A series of offsets were taken from a chain line to a curved boundary line at intervals of 15m in the following order.

0, 2.65, 3.80, 3.75, 4.65, 3.60, 4.95, 5.85m.

Compute the area between the chain line, curved boundary and the end offsets by Trapezoidal and Simpson's rule. **(08 Marks)**

b. A railway embankment is 10m wide with side slopes of 1:1.5 (V: H). Assuming the ground to be level in a direction transverse to the centerline, calculate the volume contained in a length of 120m, the centre heights at 20m intervals being in 'm' 2.2, 3.7, 3.8, 4.0, 3.8, 2.8, and 2.5. Compute the volume by Trapezoidal and prismoidal rule. **(08 Marks)**

OR

10 a. Enumerate the characteristics of contours with sketches. **(08 Marks)**

b. Calculate the area of a closed traverse ABCDA by independent co-ordinates method.

Line	Lat	Dep
AB	+108	+4
BC	+15	+249
CD	-123	+4
DA	0	-257

(08 Marks)

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10CV35

Third Semester B.E. Degree Examination, Dec.2016/Jan.2017
Fluid Mechanics

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Give reasons for the following:
   i) Viscosity of the fluid decreases with increase in temperature.
   ii) Shape of water droplet is spherical.
   iii) Capillary rise occurs when glass tube is immersed in water.
   iv) Specific gravity is dimensionless. **(04 Marks)**

   b. Derive an expression for capillary rise in a glass tube immersed in water. **(08 Marks)**

   c. The space between two square flat plates of 800mm side is filled with an oil film of 20mm thickness. Lower plate is stationary and upper plate moves at a speed of 3.2m/s when 50N force is applied. Calculate:
   i) Shear stress
   ii) Dynamic viscosity of oil in poise
   iii) Kinematic viscosity of oil if G = 0.90. **(08 Marks)**

2 a. Differentiate between:
   i) Pressure intensity and pressure head
   ii) Simple and differential manometers
   iii) Absolute and gauge pressure. **(06 Marks)**

   b. Draw the neat sketch of Bourdon pressure gauge and explain the working. **(06 Marks)**

   c. An U-tube differential manometer connects two pipes A and B. Pipe A contains CCl_4(G = 1.59) under 130kN/m^2 gauge pressure. Pipe B contains oil (G = 0.82) under 200kN/m^2 gauge pressure. Pipe A is 2.5m above pipe B. The manometer contains mercury. Calculate the difference in mercury levels. Draw neat sketch. The level of mercury connected to pipe A is in level with center of pipe B. **(08 Marks)**

3 a. Derive an expression for total pressure and center of pressure on a plane surface immersed vertically in water. **(08 Marks)**

   b. A gravity dam shown in Fig.Q.3(b) withhold water to a depth of 10m. Upstream face of dam is vertical for 7m depth and inclined at 20° with vertical for the remaining height as shown in figure. Determine the pressure force on vertical and inclined faces per unit length of dam. Also locate their respective center of pressures. **(12 Marks)**

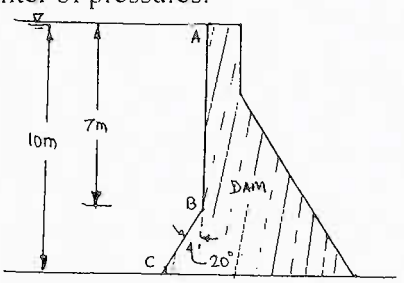

Fig.Q.3(b)

4 a. Define stream function and velocity potential function. Obtain Cauchy – Rieman equations. **(06 Marks)**

b. Derive continuation equation using stream tube. **(08 Marks)**

c. The velocity components for a 2D flow are u = xy and $v = x^2 - \frac{1}{2}y^2$. Check i) whether they represent the possible flow case; ii) Whether flow is irrotational. **(06 Marks)**

PART – B

5 a. List the assumptions made in deriving Bernoulli's equation. **(06 Marks)**

b. Crude oil of G = 0.84 flows through a pipe with a rate of 450 lps. The diameter of pipe and pressure in the pipe at one section are respectively 25cm and 55kPa and at section two are 50cm and 320kPa. Find the direction of flow through pipe and head loss. Pipe is horizontal. **(06 Marks)**

c. A 300mm diameter pipe carries water under a head of 20m with a velocity of 3.5m/s. If the axis of the pipe turns through 45°, find the magnitude and direction of resultant force on the bend. **(08 Marks)**

6 a. Derive Darcy-Weisbach equation for head loss due to friction in a pipe. **(07 Marks)**

b. The rate of flow through a horizontal pipe is 0.03 m^3/s. Length of pipe is 1km. Diameter of pipe for first half of length is 20cm and suddenly enlarges to 40cm for the remaining length. Find the difference in water surface elevation in the two reservoirs connected to either side of pipe. Take f = 0.01 in equation $fLV^2/2gD$. Consider minor losses. **(08 Marks)**

c. The water is flowing with a velocity of 1.25m/s in a pipe of 2km length and 250mm diameter. The valve at the end of pipe is closed in 27sec. Find the rise in pressure. Take C = 1400m/s. **(05 Marks)**

7 a. Explain the measurement of depth using: i) Staff gauge; ii) Float gauge; iii) Self-recording gauge. **(12 Marks)**

b. Derive the expression for the point velocity using pitot tube. **(08 Marks)**

8 a. Derive an expression for discharge over a rectangular notch. **(08 Marks)**

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

c. A horizontal venturimeter with inlet diameter 20cm and throat 10cm is used to measure the flow of oil (G = 0.8). The discharge is 60//s. find the reading of oil-mercury differential manometer. $C_d = 0.98$. **(08 Marks)**

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CBCS Scheme

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15CT/CV35

Third Semester B.E. Degree Examination, Dec.2016/Jan.2017
Engineering Geology

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. What is Engineering Geology? Name the modules of Engineering Geology you have studied. Explain the importance of each module. **(08 Marks)**

b. Explain the role Engineering Geology in civil engineering projects. **(08 Marks)**

OR

2 a. Name the physical properties which are helpful to identify the minerals. Explain streak and Fracture of a mineral with suitable examples. **(08 Marks)**

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

Module-2

3 What are igneous rocks? How are they formed? Explain the classification of igneous rocks with suitable examples. Mention the engineering considerations of igneous rocks. **(16 Marks)**

OR

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

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

Module-3

5 Define weathering. Explain the types of weathering. Add a note on effects of weathering on civil engineering projects. **(16 Marks)**

OR

6 a. Explain Geomorphological aspects in the selection of site for a Dam. **(08 Marks)**

b. What are Landslides? Explain the causes and prevention of landslides. **(08 Marks)**

Module-4

7 a. With a neat sketch explain the Hydrologic cycle. **(06 Marks)**

b. Explain Groundwater exploration by electrical resistivity method. **(10 Marks)**

OR

8 Write a note on :

a. Aquifer and its types

b. Classification of subsurface water

c. Porosity and permeability

d. Specific yield and specific retention **(16 Marks)**

Module-5

9 Write a note on :

a. Applications of Remote sensing
b. Applications of Geographic Information system (GIS)
c. Applications of Global Positioning system (GPS).
d. Uses of Geological maps. **(16 Marks)**

OR

10 Write a note on :

a. Impact of mining on Environment
b. Natural Disaster and their mitigation
c. Definition and uses land sat imageries
d. Impact of Reservoirs on environment. **(16 Marks)**

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CBCS Scheme

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15CV36

Third Semester B.E. Degree Examination, Dec.2016/Jan.2017
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. Write the requirements of good building stones. **(04 Marks)**

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

c. Briefly explain the tests conducted on bricks. **(06 Marks)**

OR

2 a. Write the requirements of good mortar. **(04 Marks)**

b. Briefly explain the tests conducted on fine aggregates.
i) Sieve analysis; ii) Specific gravity test. **(06 Marks)**

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

Module-2

3 a. Write the essential requirements of good foundation. **(04 Marks)**

b. With neat sketches, explain the following types of foundation:
i) Combined footing; ii) Strap footing. **(06 Marks)**

c. With neat sketch, write the features of English bond and Flemish bond. **(06 Marks)**

OR

4 a. Briefly explain classification of stone masonry. **(06 Marks)**

b. With neat sketch, explain various joints provided in stone masonry. **(06 Marks)**

c. Write the advantages of cavity walls. **(04 Marks)**

Module-3

5 a. Define lintel and write the function of lintel. **(04 Marks)**

b. With neat sketch explain various components of a segmental arch. **(06 Marks)**

c. Write the requirements of good floor and factors affecting selection of flooring material. **(06 Marks)**

OR

6 a. Write the requirements of good roof. **(04 Marks)**

b. Write the advantages and disadvantages of flat roof compared to pitched roof. **(06 Marks)**

c. With the help of neat sketch, explain various components of queen post truss. **(06 Marks)**

Module-4

7 a. Explain the following doors with neat sketches:
i) Partly paneled and glazed door; ii) Revolving door. **(06 Marks)**

b. Explain the following windows with neat sketches:
i) Bay window; ii) Corner window. **(06 Marks)**

c. Write the requirements of good stair. **(04 Marks)**

OR

8 a. Briefly explain classification of stairs. **(04 Marks)**

b. Plan a dog legged stair for a building in which the vertical distance between the floors is 3.6mt. The stair hall measures 2.5m × 5m. **(06 Marks)**

c. Write short notes on: i) Shoring; ii) Under pinning. **(06 Marks)**

Module-5

9 a. Write the objectives of plastering and requirement of good plaster. **(06 Marks)**

b. Discuss the defects in plastering. **(06 Marks)**

c. Briefly explain method of applying stucco plastering. **(04 Marks)**

OR

10 a. Briefly explain the methods of damp proofing. **(06 Marks)**

b. Explain in brief defects in painting and constituents of a point. **(06 Marks)**

c. Describe the procedure of painting on new wood work. **(04 Marks)**

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10CV42

Fourth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Concrete Technology

Time: 3 hrs. Max. Marks:100

Note: 1. *Answer FIVE full questions, selecting at least TWO questions from each part.*
2. *Use of code Book IS10262-2009 is allowed.*

PART – A

1 a. List at least Five of the various cement types being used in practice. Give their field application. **(10 Marks)**

b. Describe the following terms with respect to cement :
i) Normal consistency
ii) Water cement ratio
iii) Initial setting time
iv) Soundness. **(10 Marks)**

2 a. Explain the laboratory procedure to determine the SP. Gravity of coarse Aggregate sample. State the importance of size and shape of aggregate in concrete. **(10 Marks)**

b. Give the procedure to determine the Bulk density of fine aggregate sample. Describe the importance of the same. **(10 Marks)**

3 a. Define workability. Explain how
i) Mix proportion and
ii) Size of aggregate affect workability. **(10 Marks)**

b. What are the tests adopted in laboratory to determine workability of concrete mix? Brief the Advantages of slump test over compaction factor test. **(10 Marks)**

4 a. State the function of an 'Admixture' in concrete mix. Differentiate between chemical and mineral Admixtures. **(10 Marks)**

b. Describe the effect of fly ash on fresh concrete. **(10 Marks)**

PART – B

5 a. List the tests conducted to determine the properties of Hardened concrete. Explain how water cement ratio influences the strength of Hardened concrete. **(10 Marks)**

b. Brief the stress-strain behaviour of concrete under compression. How do you determine the modulus of elasticity of given concrete sample? **(10 Marks)**

6 a. Define the terms with respect to concrete:
i) Poisson's ratio
ii) Shrinkage
iii) Creep
iv) Elasticity
v) Compression strength. **(10 Marks)**

b. State the types of Shrinkage occurring in concrete. Explain plastic Shrinkage. **(10 Marks)**

7 a. Define the term permeability of concrete. Explain the factors that influence permeability of concrete. **(10 Marks)**

b. Discuss the process of disintegration of concrete due to acids. Suggest remedies to control sulphate attack. **(10 Marks)**

8 a. Brief the importance of mix design in "Concrete Technology". **(05 Marks)**

b. Obtain the first trial mix of M_{20} grade as per IS 10262 for the following requirements

Max size of aggregates angular shape		–	20mm
Degree of workability		–	0.90
Degree of quality control		–	Good
Types of Exposure		–	Mild
Properties of material available : –			
Cement specific gravity		–	3.15
Specific gravity of coarse aggregate		–	2.60
Specific gravity of fine aggregate		–	2.60
Free moisture content	Coarse aggregate	–	Nil
	Fine aggregate	–	20%
Water absorption	Coarse aggregate	–	0.50%
	Fine aggregate	–	1.0%

(15 Marks)

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10CV43

Fourth Semester B.E. Degree Examination, Dec.2016/Jan.2017

Structural Analysis – I

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define: i) One, two and three dimensional structural systems with examples.
ii) Degrees of freedom with examples.
iii) Linear and non-linear structures. **(08 Marks)**

b. Find the degree of static indeterminacy of the following structures as shown in Fig.Q1(b).

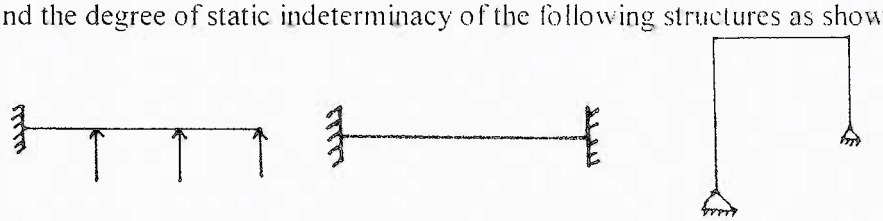

Fig.Q1(b)(i) Fig.Q1(b)(ii) Fig.Q1(b)(iii) **(06 Marks)**

c. Derive an expression for strain energy stored in a bar due to axial load. **(06 Marks)**

2 a. Find the slope at A. and deflection at C. in the beam shown in Fig.Q2(a). by moment area method. Take EI as constant.

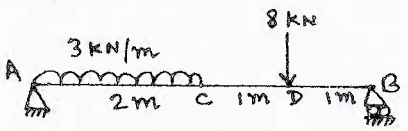

Fig.Q2(a) **(10 Marks)**

b. Find the slope and deflection at the free end of the cantilever beam shown in Fig.Q2(b) using conjugate beam method. Take EI = 2.5×10^6 kNm^2.

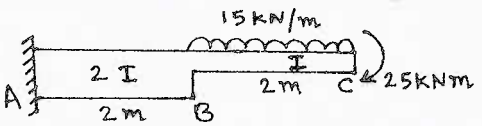

Fig.Q2(b) **(10 Marks)**

3 a. State: i) The first and second theorem of Castigliano. ii) The Bettis law and Maxwells theorem of reciprocal deflections. **(08 Marks)**

b. Compute the vertical displacement at the free end D. of the frame by strain energy method. If EI = 2×10^4 kNm^2, the frame is as shown in Fig.Q3(b).

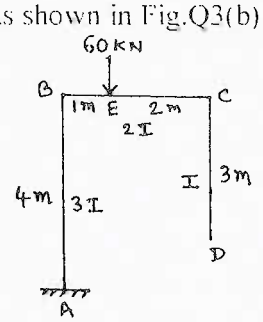

Fig.Q3(b) **(12 Marks)**

4 a. Analyze the propped cantilever subjected to the loadings as shown in the Fig.Q4(a), using strain energy method. EI is constant. Calculate "R" and "M_A".

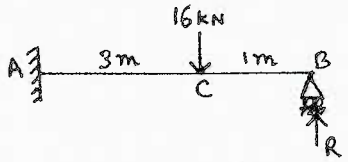

Fig.Q4(a) **(08 Marks)**

b. Analyze the fixed beam subjected to the loadings as shown in the Fig.Q4(b), using strain energy method. Calculate the fixed end moments and the vertical reactions at A and B.

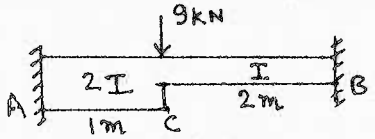

Fig.Q4(b) **(12 Marks)**

PART – B

5 a. Prove that the bending moment diagram follows the Funicular polygon in a three hinged parabolic arch subjected to uniformly distributed load throughout. **(10 Marks)**

b. A symmetrical suspension cable is parabolic in shape, and has a span of 250 m and a dip of 25 m. It supports a UDL of 25 kN/m over the whole span. If the maximum allowable stress is 130 N/mm^2, determine the length of the cable and area of the cable. **(10 Marks)**

6 a. Analyze the propped cantilever beam subjected to the loadings as shown in the Fig.Q6(a), by consistent deformation method. Support B sinks by 25 mm. Take E = 10 GPa and I = 20×10^6 mm^4. Draw BMD and SFD.

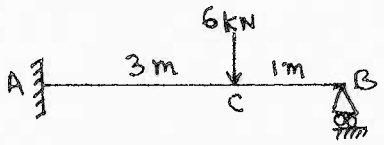

Fig.Q6(a) **(10 Marks)**

b. Analyze the fixed beam subjected to the loadings as shown in the Fig.Q6(b), by consistent deformation method. Draw SFD.

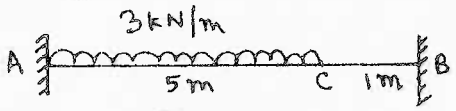

Fig.Q6(b) **(10 Marks)**

7 Analyze the continuous beam subjected to the loadings as shown in the Fig.Q7, using Claperons three moment theorem. Draw BMD. EI is constant throughout.

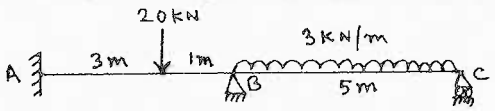

Fig.Q7 **(20 Marks)**

8 A parabolic arch hinged at the ends has a span of 60 m, and a rise of 12 m. A concentrated load of 8 kN acts at 15 m from the left hinge. The second moment of area varies as the secant of the inclination of the arch axis. Calculate the horizontal thrust and the reactions at the hinges. **(20 Marks)**

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10CV44

Fourth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Surveying – II

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. With neat sketch and tabular column, explain the measurement of horizontal angle by repetition method. List the errors that are eliminated by this method. **(10 Marks)**

b. Explain the procedures for extending a straight line using a transit when it is in adjustment and not in adjustment. **(10 Marks)**

2 a. Explain with a neat sketch 'two peg method' adopted in the permanent adjustment of a level. **(10 Marks)**

b. A dumpy level was set up at L_1, exactly midway between A and B which are 50m apart. The readings on the staff when held on A and B were respectively 2.40m and 1.40m. The instrument was then shifted and set up at point L_2 on the line AB produced at 10m from A. The readings on the staff held at A and B were respectively 2.5m and 1.4m. Determine the staff readings on A and B to give a horizontal line of sight. Determine the RL of B, if that of A is 200.00m. **(10 Marks)**

3 a. Explain the method of determining the distance and elevation of an object using trigonometrical levelling, when the base is inaccessible and the instrument stations are in the same plane as that of the object. Derive the required equations. **(10 Marks)**

b. Find the reduced level of a Church spire 'C' from the following observation taken from two stations A and B, 50mt apart, angle BAC = 60° and angle ABC = 50°, angle of elevation from A to top of spire = 30°, angle of elevation from B to top of spire = 29°, staff reading from A on BM of RL 20m = 2.50m, staff reading from B to same BM = 0.50m. **(10 Marks)**

4 a. Derive the expressions for distance and elevation when the staff is held vertical and the line of sight is inclined. **(10 Marks)**

b. The following observations were made using a tacheometer fitted with anallactic lens having the constant to be 100 and the staff held vertical:

Inst. Stn	Ht. of instrument	Staff stn	WCB	Vertical angle	Hair reading
0	1.550	A	30° 30′	4° 30′	1.155, 1.755, 2.355
		B	75° 30′	10° 15′	1.250, 2.000, 2.750

Calculate: i) The horizontal distance AB; ii) RL of A and B and iii) Gradient from A to B, if RL of 0 is 150.000m. **(10 Marks)**

PART – B

5 a. What are the different methods of setting out a simple circular curve? **(04 Marks)**

b. Calculate the ordinates at 10mt distance for a circular curve having a long chord 80 meters and versed sine of 4 mts. **(06 Marks)**

c. Two tangents interest at a chainage 1000mt, the deflection angle being 28°. Calculate the necessary data to setout a simple circular curve of radius 250 mts. by Rankine's deflection angle method and tabulate the results. Peg interval = 20mt. Least count of theodotile = 20″. **(10 Marks)**

6 a. With neat sketch, explain the various elements of a compound curve. Derive the relations for calculating the chainages of tangent points. **(10 Marks)**

b. Two tangents AB and BC interest at B. Another line DE intersect AB and BC at D and E such that LADE = 150° and LDEC = 140°. The radius of the first curve is 200m and that of the second is 300m. Calculate all the necessary data for setting out a compound curve if the chainage of B is 1050m. **(10 Marks)**

7 a. What is transition curve? Discuss the purpose of introducing transition curve between a straight and a simple curve. **(06 Marks)**

b. What is vertical curve? With sketch briefly explain different types of vertical curves. **(04 Marks)**

c. A transition curve is required for a circular curve of 200m radius the gauge being 1.5m and maximum super elevation restricted to 15cm. The transition is to be designed for a velocity such that no lateral pressure is imposed on the rails and the rate of gain of radial acceleration is $30cm/sec^3$. Calculate the required length of the transition curve and the design speed. **(10 Marks)**

8 a. What is Simpson's rule? Derive the expression for it. **(06 Marks)**

b. What is 'zero circle' of a planimeter? Explain any one method of finding its area. **(06 Marks)**

c. A road embankment is 10mt 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 meters, the centre of heights at 20m intervals being in meters. 2.20, 3.70, 3.80, 4.00, 3.80, 2.80, 2.50. **(08 Marks)**

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10CV45

Fourth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Hydraulics and Hydraulic Machines

Time: 3 hrs. Max. Marks:100

Note: *1. Answer FIVE full questions, selecting at least TWO questions from each part.*
2. Missing data may be suitably assumed.

PART – A

1 a. What is meant by dimensional homogenity of an equation? Explain with an example. **(05 Marks)**

b. Define and give expressions for,
i) Reynolds number
ii) Froude number
iii) Euler's number
iv) Weber number and
v) Mach number. **(05 Marks)**

c. A spill way model is to be built to a geometrically similar scale of 1/50 across a flume of 600mm width. The prototype is 15m high and maximum head on it is expected to be 1.5m. i) What height of the model and what head on the model should be used? ii) If the flow over the model at a particular head is 12 litre/s, what flow per metre length of the prototype is expected? iii) If the negative pressure in the model is 200mm, what is the negative pressure in prototype? Is it practicable? **(10 Marks)**

2 a. Derive an expression for discharge through open channel by Chezy's formula and obtain an expression for conveyance. **(10 Marks)**

b. A trapezoidal channel carries water of $25 m^3/s$ which has a side slope of 60°. Find the most economical channel cross section if C = 50 and slope of bed is 1 in 1000. [C = Chezy's constant]. **(10 Marks)**

3 a. Draw a typical plot of depth of flow v/s specific energy for a non-uniform flow and label the curves of energy. Further indicate point of critical depth, region of supercritical flow and subcritical flow. **(10 Marks)**

b. A rectangular channel of 8m wide discharges water through a sluice gate with a depth of flow of 0.4m, and velocity 6 m/s. Find whether hydraulic jump will occur and if so, find the height of hydraulic jump and loss of energy per kg of water. Also find the power lost in hydraulic jump. **(10 Marks)**

4 a. Using impulse-momentum principle, derive an expression for force normal to plate by the impact of jet at the centre of a stationary inclined plate. Further derive expressions for force in the direction of jet and normal to jet. The profile of plate is flat. **(10 Marks)**

b. A jet of water 150mm diameter strikes a series of flat plate normally with a velocity of 12m/s. The plate is moving with a velocity of 6m/s in the direction of jet. Find: i) the force exerted by the jet on the plate; ii) Work done by the jet on the plate per second; ii) Power of the jet; iv) Efficiency of moving plate. **(10 Marks)**

PART – B

5 a. Show that for a moving symmetrical curved vane impinged by a jet of water at the centre, the maximum hydraulic efficiency is given by, $\frac{8}{27}(1+\cos\theta)$, where θ = angle of deflection of water from the vane. **(10 Marks)**

b. A jet of water having velocity of 45 m/s impinges without shock on a series of vanes moving at 15m/s, the direction of motion of vanes being inclined at 20° to that of jet. The relative velocity at the outlet is 0.9 times of that at inlet. Absolute velocity of water at exit is to be normal to the motion of vanes. Find: i) Vane angles at entrance and exit; ii) Hydraulic efficiency. **(10 Marks)**

6 a. Draw energy block diagram of a Pelton wheel arrangement showing nozzle, Pelton wheel, shaft and give expressions for i) Power at the nozzle; ii) Kinetic energy of jet outside the nozzle; iii) Hydraulic power after the Pelton wheel; iv) Shaft power; v) Nozzle efficiency; vi) Hydraulic efficiency; vii) Mechanical efficiency and viii) Overall efficiency. **(10 Marks)**

b. Design a Pelton wheel turbine required to develop 1475 kW of power under a head of 160m at 410 rpm. Take overall efficiency as 85% and coefficient of velocity in the nozzle as 0.98 and speed ratio as 0.48, jet ratio = 12. **(10 Marks)**

7 a. Draw a neat diagram of cross section of a Kaplan turbine and explain its working principle. **(10 Marks)**

b. The hub diameter of a Kaplan turbine, working under a head of 12m, is 0.35 times the diameter of the runner. The turbine is running at 100rpm. If the vane angle of the extreme edge of the runner at outlet is 15°, and flow ratio = 0.6, find: i) Diameter of the runner; ii) Diameter of the boss and iii) Discharge through the runner.
Assume velocity of whirl at outlet as zero. **(10 Marks)**

8 a. For a centrifugal pump, write the definition and expression for i) Manometric efficiency; ii) Mechanical efficiency; iii) Overall efficiency in terms of manometric head, blade speed at outlet and velocity of whirl at outlet. **(10 Marks)**

b. A four stage centrifugal pump has four identical impellers, keyed to same shaft. The shaft is running at 400rpm and the total manometric head developed by the multistage pump is 40m. The discharge through pump is 0.2 m^3/s. The vanes of each impeller are having outlet angle as 45°. If the width and diameter of each impeller at outlet is 5cm and 60cm respectively. Find the manometric efficiency. **(10 Marks)**

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CBCS Scheme

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15CV/CT32

Third Semester B.E. Degree Examination, June/July 2017
Strength of Materials

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define : (i) Poisson's ratio (ii) Volumetric strain (iii) Temperature stresses **(06 Marks)**

b. A steel bar of 20 mm diameter is subjected to tensile load test. Determine stress, strain, Young's modulus, % elongation from the following data:
Gauge length – 200 mm, Extension at a load of 100 kN – 0.147 mm, Total elongation 50 mm. Also determine the % decrease in cross sectional area of the specimen if the diameter of the rod at failure is 16 mm. **(10 Marks)**

OR

2 a. Derive the relationship between Young's modulus and shear modulus with usual notation. **(06 Marks)**

b. A steel tube 45 mm external diameter and 3 mm thick encloses centrally a solid copper bar 30 mm diameter. The bar and the tube are rigidly connected together at their ends at a temperature of 30°C. Find the stresses developed in each material when heated to 180°C. Take $E_S = 200\,GPa$, $\alpha_S = 10.8\times10^{-6}/°C$; $E_C = 110\,GPa$, $\alpha_C = 17\times10^{-6}/°C$ **(10 Marks)**

Module-2

3 a. Derive Lami's equation for thick cylinders. **(06 Marks)**

b. The state of stress at a point in a strained material is as shown in the Fig. Q3 (b)
Determine (i) Principal stresses and principal planes (ii) Max shear stress and its plane
(iii) Sketch the stress diagram showing stresses and planes. **(10 Marks)**

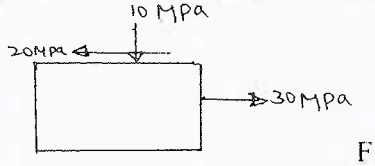

Fig. Q3(b)

OR

4 a. Derive expressions for normal stress and tangential stress for a member subject to uniaxial loading. **(06 Marks)**

b. A shell 3.25 m long, 1 m diameter is subjected to internal fluid pressure of 1 MPa. If the thickness of the shell is 10 mm. Find Hoop stress, longitudinal stress, max shear stress and change in diameter and length. Take $E = 2\times10^5$ MPa, $\frac{1}{m} = 0.3$. **(10 Marks)**

Module-3

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

b. A simply supported beam is subject to a point load of 15 kN together with udl of 15 kN/m applied as shown in Fig. Q5 (b). Draw SFD and BMD. Find also point of zero shear and its corresponding BM. **(10 Marks)**

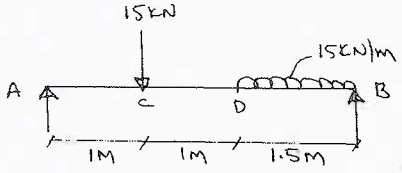

Fig. Q5 (b)

OR

6 a. Show that max BM for a simply supported beam of length l carrying udl of intensity W/unit length is $\frac{Wl^2}{8}$. **(06 Marks)**

b. Draw SFD and BMD for the load diagram, shown in Fig. Q6 (b). Mark the values at salient points. **(10 Marks)**

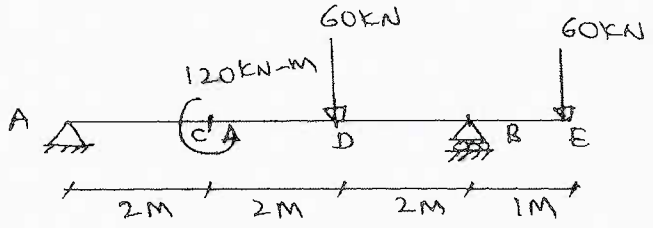

Fig. Q6 (b)

Module-4

7 a. Derive the bending equation, $\frac{M}{I} = \frac{f}{y} = \frac{E}{R}$ with usual notation. **(06 Marks)**

b. A hallow tube of 6 m length with external diameter 60 mm and thickness 10 mm is subject to minimum crippling load. Find Euler's critical load for this column : (i) When both ends are fixed. (ii) When one end fixed other end hinged. Assume E = 200 GPa. **(10 Marks)**

OR

8 a. Derive expression for crippling load for a long column when both ends are hinged. **(06 Marks)**

b. A circular pipe of external diameter 70 mm and thickness 8 mm is used as a simply supported beam over an effective span of 2.5 m. Find the max concentrated load that can be applied at the centre of the span if permissible stress in the tube is 150 N/mm^2. **(10 Marks)**

Module-5

9 a. Derive the torque equation $\frac{T}{I_p} = \frac{f_S}{R} = \frac{C_\theta}{l}$ with usual notation. **(06 Marks)**

b. State the theories of failures. Explain briefly any two of the theories. **(10 Marks)**

OR

10 a. State the assumption made in the theory of pure torsion. **(06 Marks)**

b. A hallow shaft has to transmit 600 kW power at 80 rpm. The maximum torque developed may exceed the mean torque by 40%. Design a suitable section if the working stress is 90 MPa. Take diameter ratio as 0.8. What will be the angular twist measured over a length of 2 m if C = 84 GPa? **(10 Marks)**

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12

CBCS Scheme

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15CV33

Third Semester B.E. Degree Examination, June/July 2017
Fluid Mechanics

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Define the following with symbols and units:
i) Mass density ii) Specific weight **(04 Marks)**

b. Derive expression for Newton's law of viscosity and state. **(06 Marks)**

c. A cylindrical shaft of 90 mm dia rotates about a vertical axis inside a fixed cylindrical tube of length 50 cm and 95 mm internal dia. If the space between the tube and the shaft is filled by a lubricant of dynamic viscosity 8.0 poise. Determine the power required to overcome viscous resistance, when the shaft is rotated at a speed of 240 rpm. **(06 Marks)**

OR

2 a. Explain the working of a Bourdan's pressure gauge with a diagram. **(04 Marks)**

b. State and prove Pascal's law. **(06 Marks)**

c. Fig.Q2(c) shows a differential manometer connecting two points A and B. Pipe A contains carbon tetrachloride of specific gravity 1.594 under a pressure of 1.05 kgf/cm^2 and pipe B contains oil of specific gravity 0.8 under a pressure of 1.75 kgf/cm^2. If the manometer liquid is mercury, find the difference 'x' between the mercury levels.

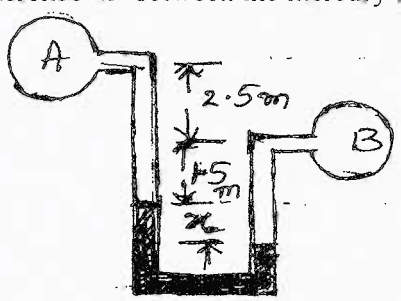

Fig.Q2(c) **(06 Marks)**

Module-2

3 a. Define: i) Total pressure, ii) Centre of pressure. **(04 Marks)**

b. Derive an expression for the depth of centre of pressure from the free surface of liquid of an inclined plane surface submerged in the liquid. **(06 Marks)**

c. A rectangular plane surface 1 m wide and 3 m deep lies in water in such a way that its plane makes an angle of 30° with the free surface of water. Determine the total pressure and the depth of centre of pressure when the upper edge of the plate is 2 m below the free surface. **(06 Marks)**

OR

4 a. Define: i) Uniform and non-uniform flow, ii) steady and unsteady flow. **(04 Marks)**

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

c. The stream function for a two dimensional flow is $\Psi = 2x^2 - 2y^2$. Find:
i) Resultant velocity at point (1, 3).
ii) Velocity potential function. **(06 Marks)**

Module-3

5 a. Define momentum equation and give its applications. **(03 Marks)**

b. State the Bernoulli's theorem. Derive the Bernoulli's equation starting from Euler's equation of motion along a stream line. **(06 Marks)**

c. A 45° reducing bend is connected in a pipeline, the diameters at the inlet and outlet are 600 mm and 300 mm respectively. Find the force exerted by the water on the bend if the intensity of pressure at inlet to bend is 88.29 kN/m^2 and rate of flow of water is 0.6 m^3/sec. **(07 Marks)**

OR

6 a. Define: i) Forced vortex, ii) Free vortex. Give one example each. **(04 Marks)**

b. Derive an expression for the discharge through a venturimeter. **(06 Marks)**

c. The water is flowing through a tapering pipe of length 50 cm, having dia 40 cm at the upper end and 20 cm at the lower end at the rate of 60 lps. The pipe has a slope of 1 in 40. Find the pressure at the lower end, if the pressure at the higher end is 24.525 N/cm^2. **(06 Marks)**

Module-4

7 a. Define the hydraulic coefficients (C_c, C_d, C_v) of an orifice and obtain the relation between them. **(05 Marks)**

b. Derive the expression for discharge through a small orifice of area 'a' under a head 'h' measured above the centre of the orifice. **(05 Marks)**

c. Water discharges freely at a rate of 98 lps through a 120 mm dia vertical sharp edged orifice under a constant head of 10 m of water. A point on the jet measured from the venacontracta has coordinates (+4.5m, –0.54m). Find hydraulic coefficients. **(06 Marks)**

OR

8 a. Explain ventilation of weirs. **(04 Marks)**

b. Derive the expression for discharge through a triangular notch. **(06 Marks)**

c. Find the discharge through a trapezoidal notch which is 1m wide at the top and 0.40 m at the bottom and is 30 cm in height. The head of water on the notch is 20 cm. given C_d for rectangular portion = 0.62 and C_d for triangular portion = 0.60. **(06 Marks)**

Module-5

9 a. Explain: i) Pipes in parallel, ii) Pipes in series. **(04 Marks)**

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

c. A pipe 50 mm diameter is 6 m long and the velocity of flow of water in the pipe is 2.4 m/sec. What loss of head and the corresponding power would be saved if the central 2 m length of pipe was replaced by 75 mm diameter pipe, the change of section being sudden? Take 4f = 0.04 for pipes of both diameters. **(06 Marks)**

OR

10 a. Explain the terms hydraulic gradient and total energy lines. **(04 Marks)**

b. Derive the expression for pressure rise due to sudden closure of valve when the pipe material is elastic. **(05 Marks)**

c. For a pipe network shown in Fig.Q10(c), determine the flow in each pipe. The value of n may be assumed as 2.0.

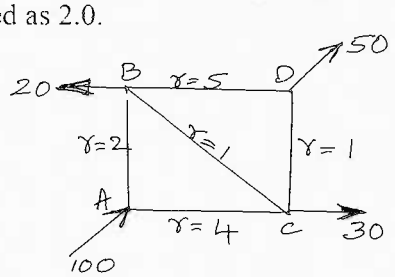

Fig.Q10(c) **(07 Marks)**

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10CV/EV/CT33

Third Semester B.E. Degree Examination, June/July 2017
Strength of Materials

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Draw the stress-strain diagram for ductile specimen under axial tensile force. Mark the salient points on the diagram and name them. **(06 Marks)**

b. Find the maximum and minimum stresses produced in the stepped bar shown in Fig.Q1(b) due to an axially applied compressive load of 12 kN.

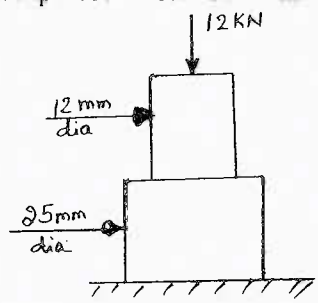

Fig.Q1(b) **(04 Marks)**

c. A 2 mt long steel bar has a uniform diameter of 40 mm for a length of 1 mt from one end. For the next 0.5 mt length the diameter decreases uniformly to "d". For the remaining 0.5 mt length it has a uniform diameter of "d" mm. When a load of 150 kN is applied, the observed extension is 2.40 mm. Determine the diameter "d". Take modulus of elasticity for steel as 200 GPa. [Refer Fig.Q1(c)]

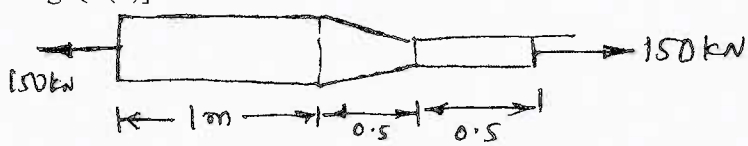

Fig.Q1(c) **(10 Marks)**

2 a. A steel bar is placed between two copper bars each having the same area and length as the steel bar at 15°C. At this stage they are rigidly connected together at both the ends. When the temperature is raised to 315°C, the length of the bars increases by 1.50 mm. Determine the original length and the final stresses in the bars. Take $E_{st} = 2.1 \times 10^5$ N/mm^2, $E_{cu} = 1 \times 10^5$ N/mm^2, $\alpha_{st} = 12 \times 10^{-6}$/°C and $\alpha_{cu} = 17 \times 10^{-6}$/°C. **(10 Marks)**

b. A concrete column 300 mm × 300 mm in cross section has 8 bars of 20 mm diameter. The column is subjected to an axial compressive load of 500 kN. Determine the stresses in each material. Also calculate the load shared by the two materials. Take the modular ratio between steel and concrete as 20. **(10 Marks)**

3 a. At a certain point in a strained material the intensities of normal stresses on two planes at right angles to each other are 20 N/mm^2 and 10 N/mm^2 both tensile. They are accompanied by shear stress of 10 N/mm^2. Find the principal planes and principal stresses. Also find the maximum shear stress. **(10 Marks)**

b. The principal stresses at a point in a bar are 200 N/mm^2 (tensile) and 100 N/mm^2 (compressive). Determine the resultant stress in magnitude and direction on a plane inclined at 60° to the axis of the major principal stress. Also determine the maximum intensity of shear stress in the material at the point. **(10 Marks)**

4 a. Establish a relationship between bending moment, shear force and loading for a laterally loaded member. **(06 Marks)**

b. Draw shear force and bending moment diagram for the beam loaded as shown in Fig.Q4(b). Also locate the points of contra flexures.

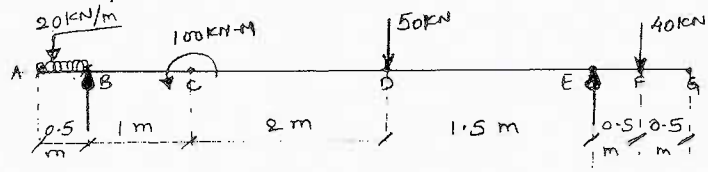

Fig.Q4(b) **(14 Marks)**

PART – B

5 a. For the section shown in Fig.Q5(a), find the (i) Position of the neutral axis, (ii) Section modulus.

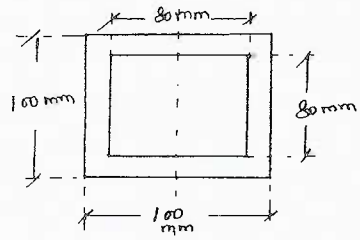

Fig.Q5(a) **(06 Marks)**

b. A steel beam of hollow section of outer side 100 mm and inner side 80 mm is used on a span of 4 mt. Find the uniformly distributed load the beam can carry if the bending stress is not to exceed 120 N/mm^2. The beam is taken as simply supported. [Refer Fig.Q5(a)] **(06 Marks)**

c. The moment of inertia of a beam section 500 mm deep is 69.49×10^7 mm^4. Find the longest span over which a beam of this section, when simply supported, could carry a uniformly distributed load of 50 kN per meter run. The flange stress in the material is not to exceed 110 N/mm^2. **(08 Marks)**

6 a. Establish the relationship between slope, deflection and radius of curvature for a beam. **(06 Marks)**

b. A horizontal girder of steel having uniform section is 14 metres long and is simply supported at its ends. It carries concentrated loads of 120 kN and 80 kN at two points 3m and 4.5m from the two ends respectively. I for the section of the girder is 16×10^8 mm^4 and $E = 210 \times 10^3$ N/mm^2. Calculate the deflections of the girder at points under the two loads. Find also the maximum deflection. **(14 Marks)**

7 a. State the assumptions in the theory of pure torsion. **(05 Marks)**

b. Define: i) Polar section modulus, ii) Torsional rigidity. **(05 Marks)**

c. The external and internal diameters of a hollow shaft are 160 mm and 120 mm respectively. If the shaft is subjected to a torque of 20 kN-m, find:
   i) Shear stress at the outer surface of the shaft
   ii) Shear stress at the inner surface of the shaft
   iii) Angle of hoist per metre length of the shaft.
   Take $C = 7.5 \times 10^4$ N/mm^2. **(10 Marks)**

8 a. Derive an expression for the Euler's crippling load for slender column having both ends of the column hinged. **(06 Marks)**

b. Find Euler's critical load for a hollow cylindrical cast iron column 200 mm external diameter and 25 mm thick, if it is 6 meters long and hinged at both ends. Take $E = 8 \times 10^4$ N/mm^2. Compare Euler's critical load with the Rankine's critical load taking $f_c = 550$ N/mm^2 and $a = 1/1600$. For what length of the column would the critical loads by Euler's and Rankine's formula will be equal? **(14 Marks)**

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CBCS Scheme

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15CV34

Third Semester B.E. Degree Examination, June/July 2017
Basic Surveying

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Compare Plane Surveying and Geodetic Surveying (any two points). **(04 Marks)**

b. Explain Indirect method of ranging, with a sketch. **(06 Marks)**

c. Explain the basic principles of Surveying with sketches. **(06 Marks)**

OR

2 a. Discuss the classification of surveying. **(08 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 901m. Similarly, the line AM was measured on the right of the line AB whose length was 1100m. Points M, B, L are in the same straight line. Lengths of the links BL and BM are 502m and 548m, respectively. Find the distance AB. **(08 Marks)**

Module-2

3 a. Compare the following : i) Fore bearing and Back bearing ii) Whole circle bearing and Quandrantal bearing iii) Meridian and Bearing. **(06 Marks)**

b. List the fundamental lines of a theodolite. Summarize the desired relationship between them. **(06 Marks)**

c. The magnetic bearing of a line was found to be N 60^0 30' W in 2002, when the declination was 5^0 10' E. Find its present magnetic bearing, if declination is 3^0 W. **(04 Marks)**

OR

4 a. Explain the following terms with reference to a theodolite :
i) Transiting ii) Swinging iii) Trunnion axis. **(03 Marks)**

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

c. The following bearings were observed in a closed compass traverse :

Line	FB	BB
AB	S 45^0 30' E	N 45^0 30' W
BC	S 60^0 00' E	N 60^0 40' W
CD	S 5^0 30' E	N 3^0 20' W
DA	N 54^0 30' W	S 56^0 00' E

Determine the stations affected by local attraction, apply the corrections and find the corrected bearings. **(05 Marks)**

Module-3

5 a. Compare the following : i) Latitude and Departure ii) Dependent coordinates and independent coordinates. **(04 Marks)**

b. Describe the closing error in a compass traverse. Explain how the closing error is adjusted by transit rule. **(05 Marks)**

c. A tachometer, 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 at	Vertical angle	Stadia readings
A	$+4^0\ 20'\ 0''$	1.300, 1.610, 1.920
B	$+0^0\ 10'\ 40''$	1.100, 1.410, 1.720

If the horizontal angle ACB is $35^0\ 20'$, determine the gradient between A and B. **(07 Marks)**

OR

6 a. Summarize the different systems of tachometric measurements. **(03 Marks)**

b. Find the expressions for distance and elevation when the staff is held vertical and line of sight is inclined. **(08 Marks)**

c. The bearings of PQ and QR are $18^0\ 36'$ and $60^0\ 24'$ respectively. The coordinates of the ends P and R are :

Point	North co-ordinates	East co-ordinates
P	300.0	400.0
R	1432.8	1257.2

Find the lengths of PQ and QR. **(05 Marks)**

Module-4

7 a. Compare the following terms used in leveling :
i) Back sight and Fore sight ii) Bench mark and Reduced level. **(04 Marks)**

b. Explain the effects of curvature and refraction in levelling. **(04 Marks)**

c. The following observations were made on a hilltop 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	$18^0\ 6'$	RL of BM
O_2	1.670	$28^0\ 42'$	= 345.580

The instrument stations were 100m apart and were in line with F. **(08 Marks)**

OR

8 a. 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. **(08 Marks)**

b. The following consecutive readings were taken along AB with a 4m levelling staff on a continuously sloping ground at intervals of 20 meters.
0.345 on A , 1.450 , 2.630 , 3.875 , 0.655 , 1.745 , 2.965 , 3.945 , 1.125 , 2.475 , 3.865 on B.
The elevation of A was 60.350. Enter the above readings in a level – book form and work out the RL's by rise and fall method. Also find the gradient of line AB. **(08 Marks)**

Module-5

9 a. List the various methods to calculate the area with their formula. **(06 Marks)**

b. Explain the following terms : i) Contour interval ii) Horizontal equivalent. **(04 Marks)**

c. The following offsets were taken from a chain line to an irregular boundary line at an interval of 10m. Compute the area by trapezoidal and Simpson's rule.
Offsets : 0 , 2.5 , 3.5 , 5.0 , 4.6 , 3.2 and 0 m. **(06 Marks)**

OR

10 a. Explain the characteristics of contours, with sketches (any five). **(05 Marks)**

b. Explain the interpolation of contours. List the methods of contouring. **(05 Marks)**

c. A road embankment is 30m wide at the top with side slopes of 2:1. The ground levels at 100m 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. **(06 Marks)**

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CBCS Scheme

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15CV/CT35

Third Semester B.E. Degree Examination, June/July 2017
Engineering Geology

Time: 3 hrs. Max. Marks: 80

Note: 1. *Answer FIVE full questions, choosing one full question from each module.*
2. *Write neat figures wherever necessary.*

Module-1

1 a. Enumerate importance and applications of Geology in Civil Engineering practices. **(06 Marks)**
b. Write a note on cleavage and fracture properties in minerals. **(05 Marks)**
c. Write the physical properties, composition and uses of Quartz and Calcite. **(05 Marks)**

OR

2 a. Describe the Internal structure and Composition of the Earth. **(06 Marks)**
b. Define a Mineral. Describe hardness property in minerals. **(05 Marks)**
c. Distinguish between Rock forming and Ore forming minerals with examples. **(05 Marks)**

Module-2

3 a. What are Igneous rocks? Describe different types of igneous rocks. **(06 Marks)**
b. Explain Rock as a construction material. **(05 Marks)**
c. Define a Fault. Describe different parts of fault, with neat figure. **(05 Marks)**

OR

4 a. What is Metamorphism? Give a note on types of metamorphism. **(06 Marks)**
b. Write a short note on Granite and Sandstone, giving their mineralogical composition and uses. **(05 Marks)**
c. What are Joints? Comment on their Engineering Importance. **(05 Marks)**

Module-3

5 a. Explain Rock Weathering and its types with examples. **(06 Marks)**
b. What is an Earthquake? Give its causes and effects. **(06 Marks)**
c. Write a note on Floods and their control. **(04 Marks)**

OR

6 a. Comment on Geomorphological aspects in selection of sites for dams and reservoirs. **(06 Marks)**
b. What are Landslides? Give a note on their control. **(05 Marks)**
c. Describe different drainage patterns. **(05 Marks)**

Module-4

7 a. What is an Aquifer? Give a note on its types with examples. **(06 Marks)**
b. Explain Electrical Resistivity method for Ground water Exploration. **(06 Marks)**
c. Write a note on Hydrological cycle. **(04 Marks)**

OR

8 a. Write a note on occurrence of Ground water in different terrains. **(06 Marks)**
b. Describe artificial recharge of Ground water. **(05 Marks)**
c. Explain Sea water intrusion and its remedies. **(05 Marks)**

Module-5

9 a. What are Topographic and Contour maps? **(06 Marks)**
b. Explain concept and applications of Remote sensing. **(05 Marks)**
c. Comment on Impact of mining and quarrying on environment. **(05 Marks)**

OR

10 a. Write a note on Global Positioning System (GPS). **(06 Marks)**
b. What is LANDSAT Imagery? Write its uses. **(05 Marks)**
c. Write a note on the Impact of reservoirs on Environment. **(05 Marks)**

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10CV35

Third Semester B.E. Degree Examination, June/July 2017
Fluid Mechanics

Time: 3 hrs. Max. Marks:100

Note: 1. ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***
2. ***Missing data if any may be suitably assumed.***

PART – A

1 a. Even though the needle is heavier than water, it can float on it, if it is placed lengthwise on the water surface. Why? **(04 Marks)**

b. If the velocity distribution for laminar flow in a pipe is given by $\frac{U}{U_{max}} = \left[1 - \frac{r^2}{R^2}\right]$. Determine the expression for shear stress τ. V = velocity at a distance r from the centre line U_{max} = Centre line velocity ; R = Radius of pipe. **(06 Marks)**

c. If the relative density of fluid is 1.59, calculate its Mass density, Specific weight and Specific volume. **(06 Marks)**

d. Determine the diameter of a droplet of water in mm. If the pressure inside is to be greater than outside pressure by 130N/mm^2. **(04 Marks)**

2 a. State Pascal's law. **(04 Marks)**

b. Determine the pressure at the bottom of sea 1.0km deep if density of sea water is 1030kg/m^3. **(06 Marks)**

c. What considerations govern the diameter of glass tube to be used in a manometer? **(04 Marks)**

d. What are the common liquids used in manometer? What conditions should it satisfy before you choose a manometric liquid? **(06 Marks)**

3 a. When will the centre of gravity and centre of pressure coincide in case of plane immersed surfaces? **(02 Marks)**

b. A circular plane surface 4m in diameter is immersed in water such that the top and bottom edges are 1.5 and 4m below the water surface. Find the total pressure and the position of centre of pressure with respect to the water surface. **(12 Marks)**

c. Derive the expression for the depth of centre of pressure for an inclined submerged plane lamina. **(06 Marks)**

4 a. Define the terms : Stream line, Streak line , Flow net and Stagnation point. **(04 Marks)**

b. Check whether the velocity components U = 3x ,V = 2z + 3x^2 and W = -3z + 2t, satisfy the continuity equation. **(04 Marks)**

c. Complete the following table : **(12 Marks)**

ψ	x	y	u	v
x + y	1.0	1.0	?	?
$2x^2 - y^2$	?	-2.0	?	4

PART – B

5 a. State the differential form of Energy equation. Integrate it. Name the resulting equation. **(06 Marks)**

b. List the assumptions made in the derivation of energy equation. **(02 Marks)**

c. A 50mm tube gradually expands to 100mm diameter tube in a length of 10 mts. If the tube makes an angle of 20^0 in upward direction with the horizontal, determine the pressure P_2 at the exit end, if the tube carries a discharge of 3.925 lts/sec and the inlet pressure P_1 is $60kN/m^2$. Assuming i) No energy loss and ii) A loss of 0.20m. **(12 Marks)**

6 a. Define the term 'Equivalent diameter' of pipe. Obtain the 'Equivalent diameter' for the system of pipes in series. **(06 Marks)**

b. A 300mm diameter pipe gradually tapers to 150mm diameter in a length of 10mts. If the discharge through pipe is $0.15m^3/sec$. Determine the loss of head due to friction, if f = 0.01. **(06 Marks)**

c. A discharge of 60.70 lits/sec of water flows through a bend in 100mm diameter pipe and gives 300mm of differential mercury head across the bend. Determine the discharge coefficient of the bend. **(08 Marks)**

7 a. Write short notes on : Weight gauge, Float gauge, Pitot tube and Current meter. **(08 Marks)**

b. A Pitot – Static tube placed in the centre of a 200mm pipe line has one orifice pointing upstream and the other perpendicular to it. If the pressure difference between the two orifices is 40mm of water when the discharge through the pipe is 1365 litres per minute. Calculate the coefficient of the pitot tube. Take the mean velocity in the pipe to be 0.83 of the central velocity. **(12 Marks)**

8 a. Derive the expression for discharge through a 'Venturimeter'. **(10 Marks)**

b. Find the discharge of water flowing over rectangular notch of 3m length when the constant head of water over a notch is 40cm. Take $C_d = 0.6$. **(10 Marks)**

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15CV36

Third Semester B.E. Degree Examination, June/July 2017
Building Materials and Construction

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. What are the requirements for a good quality building stone? Hence define : backing, corbel and coping of stones. **(06 Marks)**

b. Briefly explain the advantages of cement concrete blocks. **(04 Marks)**

c. List the different tests conducted on bricks. Explain briefly any two of them. **(06 Marks)**

OR

2 a. What are the requirements of good mortar? List the typical proportions used for cement mortar in construction industry. **(04 Marks)**

b. Briefly explain the following tests on fine aggregates :
i) bulking ii) specific gravity test. **(06 Marks)**

c. Differentiate natural and manufactured coarse aggregate. Briefly explain use and procedure of impact and abrasion test on coarse aggregates. **(06 Marks)**

Module-2

3 a. What do you understand by "bearing capacity" of soil. Define : ultimate bearing capacity and safe bearing capacity of soil. **(04 Marks)**

b. Sketch and explain following types of foundations :
i)Isolated footing ii) combined footing iii) strap beam footing. **(06 Marks)**

c. With a neat sketch, explain the features of English bond and Flemish bond with respect to brick masonry. List their merits and demerits. **(06 Marks)**

OR

4 a. Define : i) Bevelled closer ii) Mitred closer iii) King closer and iv) Queen closer. **(04 Marks)**

b. Explain different classification of stone masonry with neat sketches, wherever necessary. **(06 Marks)**

c. Compare and contrast brick work to stone work. **(06 Marks)**

Module-3

5 a. Define lintel. What are the different types of lintels used? **(04 Marks)**

b. With a neat sketch, explain the components of a segmental arch. **(06 Marks)**

c. Write short notes on : Cement flooring and Mosaic flooring. **(06 Marks)**

OR

6 a. What are the factors to be considered while selecting a roof covering? **(04 Marks)**

b. Enumerate the advantages and disadvantages of flat roofs over a pitched roof. **(06 Marks)**

c. With neat sketches, write an explanatory note on different types of roof trusses. **(06 Marks)**

Module-4

7 a. List the guide lines to be followed while locating doors and windows. **(04 Marks)**

b. Draw a neat sketch showing all the components of following types of door :
i) Fully paneled door ii) revolving door. **(06 Marks)**

c. With neat sketches, differentiate :
i) fixed window and pivoted window
ii) corner window and bay window. **(06 Marks)**

OR

8 a. Define a stair. With a neat sketch explain the following terms : i) Thread and Riser ii) Flight and landing. **(04 Marks)**

b. Plan a doglegged stair for a building in which vertical distance between the floors is 3.6m. The stair hall measures 3m × 5m (internal dimensions). **(06 Marks)**

c. Write explanatory note on : shoring and underpinning formwork. **(06 Marks)**

Module-5

9 a. What are the objectives of plastering? Explain the requirement of a good plaster. **(04 Marks)**

b. Explain the method of applying : Stucco plastering and Lathe plastering. **(06 Marks)**

c. Discuss the defects in plastering. **(06 Marks)**

OR

10 a. What are the causes of dampness in building? Hence what do you understand by damp proof course. **(06 Marks)**

b. Mention the objectives of painting and point out the characteristics of an ideal paint. **(06 Marks)**

c. Explain the method of varnishing wood works. **(04 Marks)**

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10CV/CT36

Third Semester B.E. Degree Examination, June/July 2017

Applied Engineering Geology

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain the role of geology in the field of civil engineering. (06 Marks)
b. Describe the internal structure and composition of the earth. (06 Marks)
c. Describe the hardness and cleavage with suitable mineral examples. (08 Marks)

2 a. What are igneous rocks? Explain, how are they classified based on the texture. (10 Marks)
b. Write a note on the agents of metamorphism. (06 Marks)
c. Write a note on mechanically formed group of sedimentary rocks. (04 Marks)

3 a. What is weathering of rocks? Describe the different types of weathering. (12 Marks)
b. Write a note on river meandering. (04 Marks)
c. Write a note on sand-dunes. (04 Marks)

4 a. Describe the tectonic and non-tectonic earthquakes and their causes. (10 Marks)
b. Discuss the various causes and remedial measures of landslides. (10 Marks)

PART – B

5 Write notes on the following:
a. Dip, strike and escarpment (06 Marks)
b. Joints and their types (06 Marks)
c. Ridge fault and trough fault (04 Marks)
d. Domes and basins (04 Marks)

6 a. Discuss the various geological investigations required for selecting a suitable site for the safety and stability of a Dam. (14 Marks)
b. Discuss the problems of tunneling through folded strata. (06 Marks)

7 Discuss the following:
a. Vertical distribution of groundwater in the earth crust (06 Marks)
b. Spacing of wells (04 Marks)
c. Porosity and permeability (06 Marks)
d. Groundwater recharge (04 Marks)

8 Write short notes on the following:
a. Impact of quarrying and mining on the environment (04 Marks)
b. GIS and its key component (06 Marks)
c. Fluoride and its impact on human health (04 Marks)
d. Remote sensing and its different stages in capturing surfacial data. (06 Marks)

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CBCS Scheme

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15CV42

Fourth Semester B.E. Degree Examination, June/July 2017
Analysis of Determinate Structure

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Briefly explain different forms of structures. **(03 Marks)**

b. State the assumptions made in the analysis of truss. **(04 Marks)**

c. Find the forces in the numbered members of the loaded truss shown Fig.Q1(c) using method of sections.

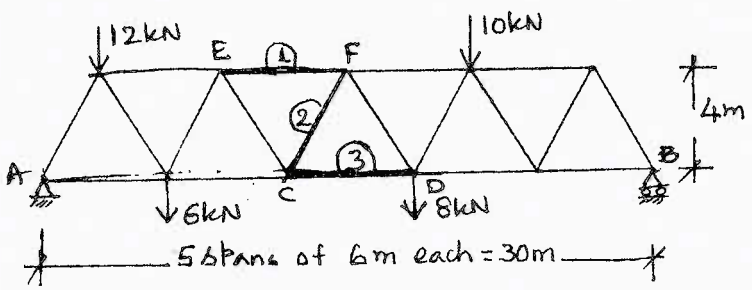

Fig.Q1(c) **(09 Marks)**

OR

2 a. Explain statically determinate and indeterminate structures with examples. **(04 Marks)**

b. Analyze the loaded truss shown in Fig.Q2(b) by method of joints and tabulate the results neatly.

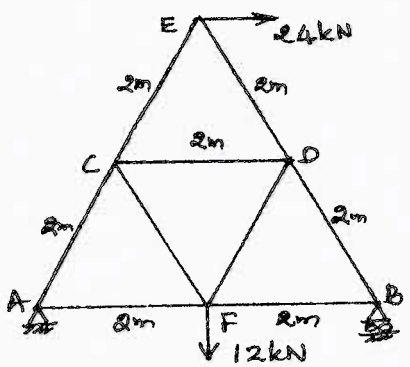

Fig.Q2(b) **(12 Marks)**

Module-2

3 a. Derive the differential equation of deflected curve for the beam. **(04 Marks)**

b. Determine the maximum deflection at the free end of a cantilever beam subjected point load W at free end of span 'L' with constant EI. Use Macaulay's method. **(06 Marks)**

c. Using conjugate beam method, find the deflection at end of a cantilever beam of span 'L' subjected udl of ω/mt run over entire span. EI constant. **(06 Marks)**

OR

4 a. State first and second moment area theorems. **(04 Marks)**

b. Find the ratio of deflection at C and D for the simply supported beam shown in Fig.Q4(b). Take E = 200 GPa, I = 6×10^7 mm^4. Use Macaulay's method.

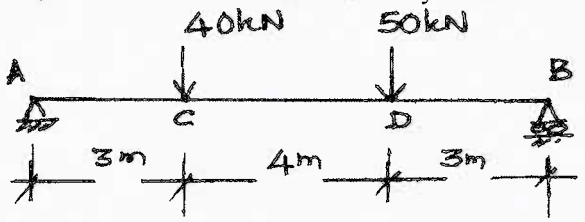

Fig.Q4(b) and Fig.Q4(c) **(05 Marks)**

c. Find the maximum deflection for the simply supported beam loaded as shown in Fig.Q4(c). Use moment-area method. **(07 Marks)**

Module-3

5 a. Derive the expression for the strain energy stored in a beam due to flexure. **(04 Marks)**

b. Find the horizontal and vertical deflection at the free end 'c' of a bent frame loaded as shown in Fig.Q5(b). Using unit load approach. Take EI = 15000 kN-m^2.

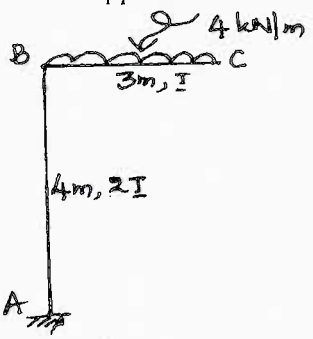

Fig.Q5(b) **(12 Marks)**

OR

6 a. For the truss shown in Fig.Q6(a), determine the vertical deflection at C by strain energy method. Take E = 210 GPa and A = 5×10^4 mm^2.

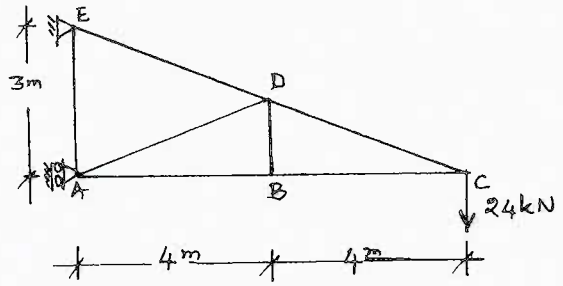

Fig.Q6(a) **(09 Marks)**

b. A cantilever beam is loaded as shown in Fig.Q6(b). Compute the deflection at point C by unit load approach. Take E = 200 GPa. I = 8×10^7 mm^4.

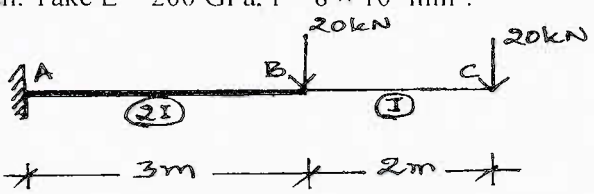

Fig.Q6(b) **(07 Marks)**

Module-4

7 a. A three hinged parabolic arch of span 30 m. rise 5m is subjected to uniformly distributed load of 20 kN/m for left half of the span. Determine support reactions at the springing levels. Also determine normal thrust. radial shear and bending moment at a section 8 m from left support. **(09 Marks)**

b. A suspension cable of span 100 m and slip 10 m carries a udl of 8 kN/m of horizontal span over the entire span. Find the maximum and minimum tension in the cable and where they occur in the cable. Find the length of cable. **(07 Marks)**

OR

8 a. A flexible suspension cable of weight 12 kN/m hangs between two vertical walls 60 mt apart, left being at a point 10 m below the right point. A point load of 200 kN is attached to cable in such a manner that the point of attachment of load is 20 m horizontally from left end wall and 5 m below the left hand support. Find the maximum and minimum tension in the cable. **(08 Marks)**

b. A parabolic arch of span 24 m with a central rise of 4 m is subjected to a point load of 30 kN at 6 m from left support and a udl of 15 kN/m over the right half of the span. Sketch BMD. also find normal thrust and radial shear at 10 m from right support. **(08 Marks)**

Module-5

9 a. What are the uses of influence line diagram? **(03 Marks)**

b. A simply supported beam of span 8m in traversed by a udl of 10 m long with intensity 20 kN/m. Draw the influence line diagram for:

i) Reaction at left support

ii) S.F at 3 mt from left support

iii) BM at 3 mt from left support.

Find the maximum values of above quantities. **(13 Marks)**

OR

10 a. A beam has a span of 20 m. Draw influence line for BM and SF at a section 8m from the left support and determine the maximum BM and SF for this section due to two point loads 80 kN and 40 kN at a fixed distance of 2m apart rolling from left to right with 80 kN load leading. **(06 Marks)**

b. Draw influence line for shear force and bending moment at a section 5 m from left support of a simply supported beam. 25 m long. Hence calculate the maximum SF and BM at this section due to uniformly distributed rolling load of 8m long with intensity 5 kN/m. **(10 Marks)**

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10CV42

Fourth Semester B.E. Degree Examination, June/July 2017
Concrete Technology

Time: 3 hrs. Max. Marks:100

Note: 1. *Answer FIVE full questions, selecting at least TWO questions from each part.*
2. *Use of IS10262-2009 is permitted.*
3. *Assume any missing data suitably.*

PART – A

1 a. Define cement. List the different types of cement and what are its applications? **(10 Marks)**
b. What is normal consistency of cement? Explain how do you determine the same. **(10 Marks)**

2 a. Explain the effect of size, shape, texture and grading of aggregates on the strength of concrete. **(10 Marks)**
b. List the different types of test conducted on coarse aggregate and fine aggregate. Explain any one in each. **(10 Marks)**

3 a. What is workability of concrete? Discuss the various factors which influence the workability. **(10 Marks)**
b. Explain briefly relative to the concrete. i) Bleeding ii) Segregation iii) Compaction iv) Curing. **(10 Marks)**

4 Specify the type, its effect and its applications of the following admixture.
i) Accelerators ii) Retarders iii) G.G.B.S iv) Silica fumes. **(20 Marks)**

PART – B

5 a. Explain briefly :
i) W/C ration ii) Gel space Ratio iii) Accelerated curing. **(10 Marks)**
b. List the different types of test conducted on hardened concrete and explain any one of them. **(10 Marks)**

6 a. What is creep in concrete? What are the different factors which influences creep and Shrinkage in concrete? **(10 Marks)**
b. Discuss :
i) Relation between modulus of elasticity and strength of concrete.
ii) Factors affecting modulus of elasticity. **(10 Marks)**

7 Write shot notes on any FOUR :
a. Durability b. Permeability c. Carbonation d. Chloride attack
e. Sulphate attack f. Freezing and Thawing. **(20 Marks)**

8 a. List and explain briefly the factors influencing the choice of Mix proportions. **(10 Marks)**
b. Write the steps to be followed in I.S method of mix design. (Step by Step procedure). **(10 Marks)**

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CBCS Scheme

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15CV43

Fourth Semester B.E. Degree Examination, June/July 2017
Applied Hydraulics

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. What is meant by dimensionally homogeneous equation? Explain with an example. **(04 Marks)**

b. Define i) Center of buoyancy ii) Metacenter. How these are used to identify the equilibrium condition of floating bodies? **(06 Marks)**

c. In a 1:30 model of spillway, the velocity and discharge are 1.5m/s and $2m^3/s$. Find the corresponding velocity and discharge in prototype. **(06 Marks)**

OR

2 a. Using Buckingham π-theorem, derive the following relationship

$$R = \rho V^2 D^2 . \phi\left[\frac{\mu}{\rho VD}, \frac{H}{D}\right]$$

Where R = Resistance, ρ = density, V = Velocity of flow, D = diameter, μ = Viscosity, H = hight. **(07 Marks)**

b. Define :

i) Geometric similarity ii) Kinematic similarity and iii) Dynamic similarity. **(06 Marks)**

c. A body of cross-sectional area $2m^2$ and depth 5m has specific gravity 0.8. Determine the depth of immersion of the body. **(03 Marks)**

Module-2

3 a. Derive Chezy's equation for discharge through uniform flow in open channel. **(08 Marks)**

b. A 3m wide rectangular channel carries $2.4m^3/s$ discharge at a depth of 0.7m. Determine:

i) Specific energy at 0.7m depth
ii) Critical depth
iii) Alternate depth to 0.7. **(08 Marks)**

OR

4 a. For the most economical trapezoidal section show that half of top width is equal to side slope length. **(08 Marks)**

b. A rectangular channel 6m wide and 1m depth of water has a bed slope of 1 in 900 and is having n = 0.012. Determine the discharge. What will be the dimensions of the channel for maximum discharge with amount of lining being kept constant? Also compute percentage increase in discharge. **(08 Marks)**

Module-3

5 a. Derive the relationship between conjugate depths in case of hydraulic jump on a horizontal floor. **(08 Marks)**

b. A rectangular channel with bottom width 4m and bed slope 0.0008 has a discharge of $1.5m^3/s$. In a GVF in this channel the depth at a certain section is 0.3m. If n = 0.016, determine the type of profile. **(08 Marks)**

OR

6 a. Explain the classification of surface profiles in an open channel with neat sketches. **(10 Marks)**

b. A rectangular channel 8m wide discharges water with a depth of 0.4m and 6m/s velocity. Find the formation of hydraulic jump and if so, determine jump height and energy loss in meters. **(06 Marks)**

Module-4

7 a. Show that the maximum efficiency of jet striking at the center of a symmetrical single curved vane is $\left(\frac{16}{27}\right)$. vane is semicircular. **(08 Marks)**

b. A Pelton wheel turbine has to be designed for the following :
Data: Power = 6000kW, Net head = 300m, Speed = 550rpm, Jet ratio = 1/10, Overall efficiency = 85%, C_v = 0.98, Speed ratio is 0.46. Determine diameter of runner and jet, discharge and number of jets required. **(08 Marks)**

OR

8 a. Draw a neat sketch of a layout of hydroelectric power plant and explain the functions of each component. Also define different heads. **(08 Marks)**

b. A jet of water moving at 30m/s impinges on a series of curved vanes moving with a velocity of 15m/s. The jet makes an angle of 30° to the direction of motion of vane when entering and leaves at an angle of 120° to the direction of motion of vanes. Draw the velocity triangles at inlet and outlet and find :
i) The vane angle at inlet and outlet
ii) Workdone per N of water
iii) Hydraulic efficiency. **(08 Marks)**

Module-5

9 a. Define :
i) Unit head ii) Unit discharge iii) Unit power. **(03 Marks)**

b. Derive the expression for minimum starting speed of a centrifugal pump. **(06 Marks)**

c. A Kaplan turbine runner is to be designed to develop 7350kW power under a head of 5.5m with $\eta_0 = 85\%$. Boss diameter = $\frac{1}{3}$ diameter of runner, speed ratio = 2.1, Flow ratio = 0.7.
Determine :
i) Diameter of runner and boss. ii) Speed. **(07 Marks)**

OR

10 a. Define draft tube. Explain its function. Draw the neat sketches of types of draft tubes. **(06 Marks)**

b. Define: i) Manometric head ii) Static head iii) Suction head iv) Delivery head. **(04 Marks)**

c. A centrifugal pump runs at 1000rpm and delvers water against a head of 15m. The impeller diameter and width at the outlet are 0.3m and 0.05m respectively. The vanes are curved back at 30° $\eta_{man} = 92\%$. Find discharge. **(06 Marks)**

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10CV43

Fourth Semester B.E. Degree Examination, June/July 2017
Structural Analysis – I

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain with examples statically determinate and indeterminate structures. **(06 Marks)**

b. With usual notations derive an expression to determine strain energy due to bending in a beam. **(08 Marks)**

c. What are one dimensional, two dimensional and three dimensional structures? Give example for each. **(06 Marks)**

2 a. Determine the slope and deflection at the free end of the cantilever beam shown in Fig.Q2(a) by moment area method. EI = 8000 kNm^2. **(10 Marks)**

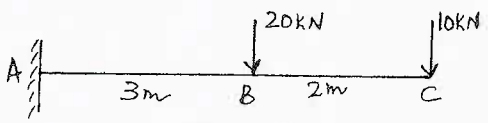

Fig.Q2(a)

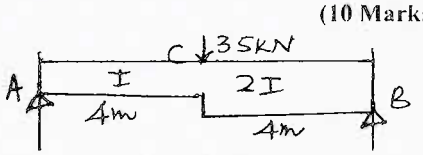

Fig.Q2(b)

b. Using conjugate beam method, find the deflection at point C and slope at A for the simply supported beam loaded as shown Fig.Q2(b). **(10 Marks)**

3 For the frame loaded as shown in Fig.Q3, calculate the vertical deflection at joint D. Take E = 200 kN/mm^2. Areas of each member in mm^2 is shown along the side of the member. Adopt unit load method. **(20 Marks)**

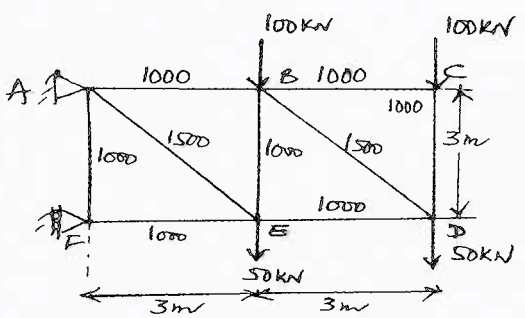

Fig.Q3

4 a. Determine the horizontal and vertical deflection at point C of the frame shown in Fig.Q4(a). E = 200 GPa, I = 6×10^7 mm^4 by strain energy method. **(12 Marks)**

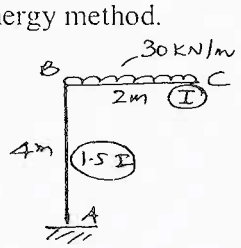

Fig.Q4(a)

b. Compute the deflection and rotation at free end of a cantilever loaded beam loaded as shown in Fig.Q4(b), using strain energy method. **(08 Marks)**

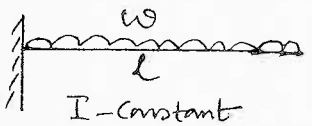

Fig.Q4(b)

PART – B

5 a. A three hinged parabolic arch of span 30 m and central rise of 5 m, is subjected to a concentrated load of 40 kN at 6 m from left support. The right hand half span of the arch is subjected to a UDL of 10 kN/m. Determine the normal thrust, radial shear and bending moment at 6 m from the left support. **(10 Marks)**

b. A suspension cable having support at the same level, has a span of 30m and maximum dip of 3m. The cable is subjected to UDL throughout. Find the length of the cable. Derive the formula you are going to use. **(10 Marks)**

6 a. For a rigidly fixed beam AB of span 5 m carrying a UDL of 12 kN/m over the entire span, draw SFD and BMD using the method of consistent deformation. **(10 Marks)**

b. For the propped cantilever shown in Fig.Q6(b). Compute the reaction at B and draw SFD and BMD. Locate the points of contraflexure if any. Use method of consistent deformation. **(10 Marks)**

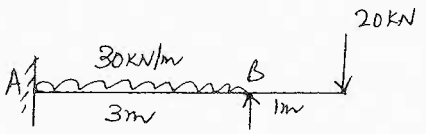

Fig.Q6(b)

7 Analyse the continuous beam loaded as shown in Fig.Q7 by Clapeyron's theorem of the three moments. EI remains constant. Draw SFD and BMD. Mark the salient points. **(20 Marks)**

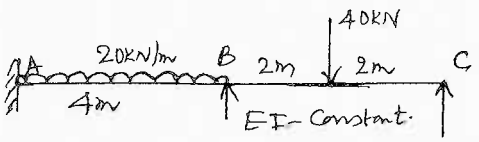

Fig.Q7

8 A two-hinged parabolic arch of span 30m and rise 6 m carries two point loads, each 60 kN, acting at 7.5m and 15m from the left end respectively. The moment of inertia varies as the secant of the slope. Determine the horizontal thrust and maximum positive and negative moments in the arch. **(20 Marks)**

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CBCS Scheme

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15CV/CT44

Fourth Semester B.E. Degree Examination, June/July 2017
Concrete Technology

Time: 3 hrs. Max. Marks: 80

Note: 1. *Answer FIVE full questions, choosing one full question from each module.*
2. *Use of IS – 10262 – 2009 is permitted.*

Module-1

1 a. Write the chemical composition of cement. Write the flow chart for dry process. **(08 Marks)**

b. Explain the importance of size, shape and texture of aggregate. **(08 Marks)**

OR

2 a. Explain the role of Admixtures in Concrete Technology. **(08 Marks)**

b. Name any four types of cement. State the properties and applications of any two types of cement. **(08 Marks)**

Module-2

3 a. Define Workability. Explain the factors influencing workability of concrete. **(08 Marks)**

b. Write note on Segregation and Bleeding. **(08 Marks)**

OR

4 a. Why curing is needed to concrete? Explain curing methods. **(08 Marks)**

b. Why compaction is required to concrete? Explain Compaction methods by vibration. **(08 Marks)**

Module-3

5 a. Explain the factors influencing the strength of concrete. **(08 Marks)**

b. Write note on : i) Creep ii) Shrinkage of concrete. **(08 Marks)**

OR

6 a. Explain Maturing concept of concrete. **(08 Marks)**

b. The strength of a sample of fully matured concrete is found to be 40MPa. Find the strength of identical concrete at the age of 7 days when cured at an average temperature during day time at 20^0C and night time at 10^0C. Take A = 32 , B = 54.Use % strength of concrete at maturity = $A + B \log_{10}\left(\frac{\text{maturity}}{1000}\right)$. **(08 Marks)**

Module-4

7 Design a concrete mix for M_{20} grade of concrete with the following design stipulation as per IS 10262 – 2009 guide lines.

a. Grade designation: M20.
b. Type of cement : Ultra Tech PPC.
c. Maximum size of Aggregate [MSA] : 20mm
d. Minimum cement content : 320 kg/m^3.
e. Maximum W/C ratio : 0.55.
f. Workability : 50 – 75mm (slump)

g. Exposure condition : Mild
h. Degree of supervision : Good.
i. Type of Aggregate : Crushed angular aggregate.
j. Max. cement content : 450 kg/m^3.
k. Chemical Admixture : Not recommended.
l. Specific gravity of cement : 3.05.
m. Specific gravity of Coarse Aggregate : 2.68.
n. Specific gravity of Fine Aggregate : 2.66.
o. Water absorption of Coarse Aggregate : 0.85%.
p. Water absorption of Fine Aggregate : 1.15%.
q. Free (surface) moisture of Coarse Aggregate : NIL.
r. Free moisture of Fine Aggregate : NIL.
s. Sieve Analysis of Coarse Aggregate : Conforming to table 2 of IS : 383.
t. Sieve Analysis of Fine Aggregate : Conforming to zone – II of IS : 383. **(16 Marks)**

OR

8 What is meant by concrete mix design? Write the steps involved in the method of mix design (IS -10262 - 2009). **(16 Marks)**

Module-5

9 a. Explain the materials used for self – compacting concrete. **(08 Marks)**
b. State the advantages and disadvantages of RMC. **(08 Marks)**

OR

10 a. Explain the fiber types used in Fiber Reinforced Concrete. **(08 Marks)**
b. State the advantages of Light Weight Concrete. **(08 Marks)**

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10CV/CT44

Fourth Semester B.E. Degree Examination, June/July 2017
Surveying – II

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Explain the method of measurement of horizontal angle by reiteration method. Mention the advantages. **(10 Marks)**

b. Explain with neat sketches, the methods of prolonging a straight line using a theodolite, when the instrument is in adjustment and when not in adjustment. **(10 Marks)**

2 a. With a neat sketch, mention the fundamental lines of a transit and explain the relationship between them. **(10 Marks)**

b. Explain two peg method of testing and adjusting line of collimation of a dumpy level. **(10 Marks)**

3 a. Explain the method of determining the distance and elevation of an object when the base of the object is inaccessible and instrument stations are in the same vertical plane as that of the object. Derive the equation. **(10 Marks)**

b. To determine the elevation of the top of an electric pole, the following observations were made.

Instrument Station	Reading on B.M	Angle of elevation	Remarks
A	1.377 m	11° 53′	RL of BM = 30.15m
B	1.263 m	8° 5′	Distance AB = 30m

Station A and B and the top of the pole are in the same vertical plane. Find the elevation of the top of the pole. **(10 Marks)**

4 a. Derive the tacheometric equation for horizontal line of sight and hence obtain the tacheometric equation for inclined line of sight. **(10 Marks)**

b. An old temple is on a small hill adjoining a road. With a view of determining the distance of the temple and the height of the tower of the temple above its plinth, observations were taken from the centre of the road upon a vertically held staff.
(i) On the plinth of the entrance door of the temple.
(ii) On the top of the tower.
The tacheometer is fitted with anallactic lens the constant of the instrument being 100.

Instrument Station	Height of Instrument	Staff Station	Vertical angle	Staff reading
Centre of Road	1.560 m	Plinth	+14° 14′	1.530, 2.100, 2.670
		Top of tower	+17° 28′	1.260, 1.900, 2.540

Calculate :
(i) Distance of plinth from the road.
(ii) R.L. of plinth, given R.L. of road as 850.740 m
(iii) Height of tower. **(10 Marks)**

PART – B

5 a. What is meant by degree of curve? Establish the relationship between degree of a curve and its radius. **(08 Marks)**

b. Derive the expression for setting out simple curve by Rankine's deflection angle method. Explain the procedure. **(12 Marks)**

6 a. Two straights AB and BC intersect at B with a deflection angle of 75° and chainage of 3415m. The straights are to be connected by a compound curve with first arc of 600m and that of second arc of 400m radius. If the chainage of point of curve is 2992.05 m, find the central angles of two arcs and tangent distance of compound curve corresponding to small arc. **(10 Marks)**

b. Two parallel railway lines are to be connected by a reverse curve. If the lines are 10m apart and the maximum distance between the tangent points measured parallel to the straight is 50m, find

(i) the radius 'R', if $R_1 = R_2 = R$.

(ii) the radius 'R_2', if $R_1 = 50$ m. **(10 Marks)**

7 a. List the functions and requirements of a transition curve. **(06 Marks)**

b. Why vertical curves are provided on highways? List the different types of vertical curves with sketches. **(06 Marks)**

c. A parabolic vertical curve is to be set out to connect two uniform grades of +0.9% and – 1.1%. If the rate of change of grade is – 0.25% per 100m, calculate the reduced levels of pegs on the curve if the R.L. of the point of intersection is 215.35m. The chainage of the point of intersection is 2540.00m. **(08 Marks)**

8 a. What is zero circle of a planimeter? Explain any one method of determining the area of zero circle. **(08 Marks)**

b. The following perpendicular offsets were taken at 10m intervals from a survey line to an irregular boundary. 3.82, 4.37, 6.82, 5.26, 7.59, 8.90, 9.52, 8.42, and 6.43m. Calculate the area in square metre enclosed between the survey line, the irregular boundary line and the first and last offsets by

(i) Average ordinate rule

(ii) Trapezoidal rule

(iii) Simpson's rule. **(12 Marks)**

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CBCS Scheme

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15CV45

Fourth Semester B.E. Degree Examination, June/July 2017

Basic Geotechnical Engineering

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. With the help of phase diagram of sol, define the terms:
i) Void ratio ii) Water content
iii) Degree of saturation iv) Unit weight of soil **(08 Marks)**

b. Following results were obtained from liquid limit test on a clay sample, whose plastic limit is 13% and natural water content is 18%. Determine the following:
i) Liquid limit ii) Flow index iii) Consistency index

Number of blows	5	16	23	42
Water content %	32	27.8	25.5	23.3

(08 Marks)

OR

2 a. Sketch a typical grain-size curve for (i) Well graded soil, (ii) Uniformly graded soil. Calculate uniformity coefficient and coefficient of curvature from the curve. **(04 Marks)**

b. Explain the salient features of I.S. plasticity chart for classification of fine grained soils. **(06 Marks)**

c. A partially saturated sample from a borrow pit has a natural water content of 14% and bulk unit weight of 19 kN/m^3. The specific gravity of solids is 2.70. Determine the void ratio, and degree of saturation. What will be the unit weight of the sample on saturation? **(06 Marks)**

Module-2

3 a. Distinguish between:
i) Primary and secondary valence bonds
ii) Dispersed and flocculent structures
iii) Structure of Kaolinite and Montmorillonite
iv) Isomorphism substitution and base exchange capacity **(10 Marks)**

b. Differentiate between standard and modified proctor tests. **(06 Marks)**

OR

4 a. Explain the factors affecting the degree of compaction. **(04 Marks)**

b. List the differences between compaction and consolidation. **(04 Marks)**

c. In a standard proctor test. Following results were obtained:

Mass of compacted soil in grams	1700	1890	2003	1960
Water content %	7.7	11.5	14.6	19.7

i) Draw the compaction curve showing OMC and maximum dry density.
ii) Determine the void ratio and degree of saturation.
Given, volume of mould = 950 cc and G = 2.65. **(08 Marks)**

Module-3

5 a. Define Darcy's law. Derive an expression to relate discharge velocity and seepage velocity. **(06 Marks)**

b. Explain the following terms:
i) Total stress ii) Neutral stress
iii) Effective stress iv) Quick sand condition **(06 Marks)**

c. An earthen dam is built on a impervious foundation with a horizontal filter under the downstream slope. The horizontal and vertical permeability of the soil material in the dam are respectively 4×10^{-5} m/sec and 1×10^{-5} m/sec. Full reservoir level is 20m above downstream filter. Flow net consists of 4 flow channels and 15 equipotential drops. Estimate the seepage loss per meter length of the dam. **(04 Marks)**

OR

6 a. List the properties and use of flow nets. **(04 Marks)**

b. In a falling head permeameter test, the initial head is 300 m it drops by 1 cm in 3 minutes. How much longer should the test to be continued, if the head is to drop to 180 m? **(04 Marks)**

c. Explain with neat sketch the method of locating the phreatic line in a homogenous earth dam with horizontal filter. **(08 Marks)**

Module-4

7 a. Explain mass-spring analogy of consolidation of soils. **(08 Marks)**

b. In a consolidation test, the void ratio of soil sample decreases from 1.20 to 1.10 when the pressure increases from 160 to 320 kN/m^2. Determine the coefficient of consolidation, if the coefficient of permeability is 8×10^{-7} mm/sec. **(08 Marks)**

OR

8 a. Explain under consolidated, normally consolidated and over consolidated soil. **(06 Marks)**

b. How preconsolidation pressure is determined by Casagrande's method? **(06 Marks)**

c. A soil sample 2 cm thickness take 20 minutes to reach 20% consolidation. Find the time for a clay layer 6 cm thick to reach 40% consolidation. Assume double drainage in both cases. **(04 Marks)**

Module-5

9 a. Briefly explain Mohr-Coulomb's shear strength theory. **(06 Marks)**

b. In a direct shear test on sand, sample failed at a shear strength of 70 kN/m^2 when normal stress was 100 kN/m^2. Determine angle of internal friction. Draw Mohr circle at failure. Mark major and minor principal planes. What are the values of major and minor principal stresses? **(10 Marks)**

OR

10 a. Mention the advantages and disadvantages of direct shear test. **(04 Marks)**

b. Classify shear tests based on drainage conditions. **(03 Marks)**

c. A soil has unconfined compression strength of 120 kN/m^2. In triaxial compression test, specimen of same soil (under similar conditions) when subjected to cell pressure of 40 kN/m^2, failed at an additional stress of 160 kN/m^2. Determine:
i) Shear strength parameters
ii) Angle made by failure plane with axial stress direction in case of triaxial test. **(09 Marks)**

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10CV45

Fourth Semester B.E. Degree Examination, June/July 2017
Hydraulics and Hydraulic Machines

Time: 3 hrs. Max. Marks:100

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

PART – A

1 a. Define Dimensional homogeneity of an equation. Give an example and state the uses of Dimensional Analysis. **(06 Marks)**

b. Using Buckingham's π – theorem, show that the efficiency (η) of a fan depends on the density (ρ) , Dynamic viscosity (μ) , Angular velocity (w), diameter 'D' of the rotor and the discharge 'Q'. Express efficiency (η) interms of dimensionless parameter. **(10 Marks)**

c. A 1:64 model is constructed of an open channel in concrete which has Mannings N = 0.014. Find the value of N for the model. **(04 Marks)**

2 a. Distinguish between Open channel flow and pipe flow. **(06 Marks)**

b. Show that the length of one sloping side of a most economical trapezoidal channel is equal to half of the top width. Also determine the hydraulic mean depth for this condition. **(08 Marks)**

c. A flow of water of 100 cfs flows down in a Rectangular flume of width 600mm and having adjustable bottom slope of C = 56. Find the bottom slope necessary for uniform flow with a depth of flow of 300mm. Also find the conveyance 'K' of the flume. **(06 Marks)**

3 a. Define Specific Energy and draw Specific Energy diagram. Derive an expression for critical depth and critical velocity in case of non uniform flow through rectangular channel. **(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 $50 m^3/s$. The bed of the channel is having a slope of 1:4000. Take the value of C = 60. **(06 Marks)**

c. The hydraulic jump in a rectangular horizontal channel, the discharge per unit width is $2.5 m^3/s/m$ and the depth before the jump is 0.25m. Estimate
i) The sequent depth and ii) The energy loss. **(06 Marks)**

4 a. State Impulse Momentum principle and thus give Impulse Momentum equation. Give 2 uses. **(06 Marks)**

b. Show that the force exerted by a Jet of water on an Inclined fixed plate in the direction of the Jet is given by $Fx = \rho a V^2 \sin^2 \theta$. **(08 Marks)**

c. A jet of water 7.5cm in diameter having velocity of 20m/s strikes a series of the flat plates arranged around the periphery of a wheel. If the plates are moving at a velocity of 5m/s, compute the force exerted by the jet on the plate, the workdone / sec and the efficiency of the jet. **(06 Marks)**

PART – B

5 a. A jet of water strikes an unsymmetrical moving curves plate tangentially at one of the tips. Derive an expression for the force exerted by the jet in the horizontal direction of motion. Also describe the velocity triangles and obtain an expression for work done and efficiency. **(12 Marks)**

b. A 15cm diameter jet moving at 30m/s impinges on a series of vanes moving at 15m/s in the direction of the jet. The jet leaves the vanes at 60^0 with the direction of motion of the vanes. Calculate i) The force exerted by the jet in the direction of motion of the vanes.
ii) Work done by the jet/sec. **(08 Marks)**

6 a. How the Hydraulic turbines are classified? Give examples. Describe the working of an Impulse turbine with a neat sketch. **(10 Marks)**

b. A Pelton wheel is to be designed for the following specifications :
Shaft powers = 5800 kW , Net head = 310m , Speed = 600rpm , Overall efficiency = 85% , $\frac{D}{dj} = 10$. (Ratio of wheel diameter to the jet diameter). Determine
i) The wheel diameter ii) The number of jets required iii) Diameter of the jet
iv) Quantity of water required. Assume speed ratio = 0.46 and CV = 0.98. **(10 Marks)**

7 a. What are the uses of Draft tube? Describe with neat sketches different types of draft tubes. **(08 Marks)**

b. What is Cavitation? What are the effects of Cavitation? **(04 Marks)**

c. A Kaplan turbine develops 15000 kW power at a head of 30m. The diameter of the boss is 0.35 times the diameter of the runner. Assuming a speed ratio of 2.0 , a flow ratio of 0.65 and an overall efficiency of 90%. Calculate i) Diameter of the runner ii) Rotational speed and iii) Specific speed. **(08 Marks)**

8 a. Define a centrifugal pump. Explain the main parts and working principle of single stage centrifugal pump with neat sketch. **(08 Marks)**

b. What is Priming of a centrifugal pump and why it is necessary? **(04 Marks)**

c. Calculate the vane angle at Inlet of a centrifugal pump, impeller having 300mm diameter at inlet and 600mm diameter at outlet. The Impeller vanes are set back at an angle of 45^0 to the outer rim and the entry of the pump is radial. The pump runs at 1000 rpm and the velocity of flow through the impeller is constant at 3m/s. Also calculate the work done by unit weight of water and the velocity and direction of water at outlet. **(08 Marks)**

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CBCS Scheme

USN | 2 | V | 0 | 1 | 6 | C | V | 4 | 1 | 0 | 15CV46

Fourth Semester B.E. Degree Examination, June/July 2017
Advanced Surveying

Time: 3 hrs. Max. Marks: 80

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

Module-1

1 a. Explain the following along with a neat sketch : **(08 Marks)**
i) Forward tangent ii) Point of curve iii) Deflection angle iv) Apex distance.

b. Two tangents intersect at a chainage of 1190m, the deflection angle 36^0. Compute all the data necessary to set out a curve of radius 300m by deflection angle method. The peg interval is 30m. Tabulate the results. **(08 Marks)**

OR

2 a. A reverse curve is to be set out to connect two parallel railway line 30m apart. The distance between the tangent points is 150m. Both the arcs have the same radius. The curve is set out by method of ordinates from long chord taking a peg interval of 10m. Calculate the necessary data for setting the curve. **(08 Marks)**

b. List the requirements of a transition curve (any four). **(04 Marks)**

c. With a neat sketch, list any four vertical curves. **(04 Marks)**

Module-2

3 a. Mention the points to be considered in the selection of triangular station. **(06 Marks)**

b. Triangulation station B was used in measuring angles and the instrument was necessary to shift to a satellite station S due south of main station B at a distance of 12.2m from it. The line BS bisects the exterior angle A, B, C and the angles ASB and BSC were observed to be 30^0 20' 30" and 29^0 45' 6". When the station B was observed angles CAB and ACB were observed to be 59^0 18' 26" and 60^0 26' 12". The side AC computed to be 4248.5m from the adjacent triangle. Determine the correct value of the angle ABC. **(10 Marks)**

OR

4 a. Explain the three kinds of errors. **(03 Marks)**

b. The observed values of P, Q and R at a station the angles being subjected to the condition that P + Q = R.
P = 30^0 12' 28.2" ; Q = 35^0 48' 12.6" ; R = 66^0 0' 44.4" **(08 Marks)**
Find the most probable value of P, Q and R.

c. Explain the probability curve. **(05 Marks)**

Module-3

5 a. Define the following terms :
i) Zenith and Nadir ii) Prime vertical iii) Hour angle. **(03 Marks)**

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

c. Find the shortest distance between two points A & B, given
A latitude – 18^0 24' N longitude 36^0 18 E
B latitude – 68^0 32' N longitude 126^0 34 E. **(08 Marks)**

OR

6 a. Define the following : i) Vertical circle ii) Azimuth iii) Altitude. **(03 Marks)**

b. Explain Ecliptic and Solstices. **(05 Marks)**

c. Find the shortest distance between two places A & B given that the longitudes of A and B are 15^0 0' N and 12^0 6' N and longitudes are 50^0 12' E and 54^0 0' E respectively. **(08 Marks)**

Module-4

7 a. Define the following terminologies :
i) Exposure station ii) Picture plane iii) Perspective centre. camera **(03 Marks)**

b. Mention the general features of Photographic images. **(07 Marks)**

c. Find the number of photographers (size 250 × 250mm) required to cover over a area of 20km × 16km of the longitudinal overlap is 60% and the side overlap is 30% scale the photograph is 1cm = 150m. **(06 Marks)**

OR

8 a. Derive an expression for relief displacement on a vertical photograph. **(05 Marks)**

b. Explain the procedure for aerial survey. **(05 Marks)**

c. A vertical photograph was taken at a altitude of 1200 meters above mean sea level. Determine the scale of the photograph for a terrain lying at elevations of 80 meters and 300 meters if the focal length of the camera is 15cm. **(06 Marks)**

Module-5

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

b. Define Remote sensing. Explain the stages of idealized remote sensing system. **(08 Marks)**

OR

10 a. What is GIS? Enumerate on GIS applications in civil engineering. **(08 Marks)**

b. Explain the basic principles of GPS and its application in surveying. **(08 Marks)**

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