JAGAN NATH UNIVERSITY

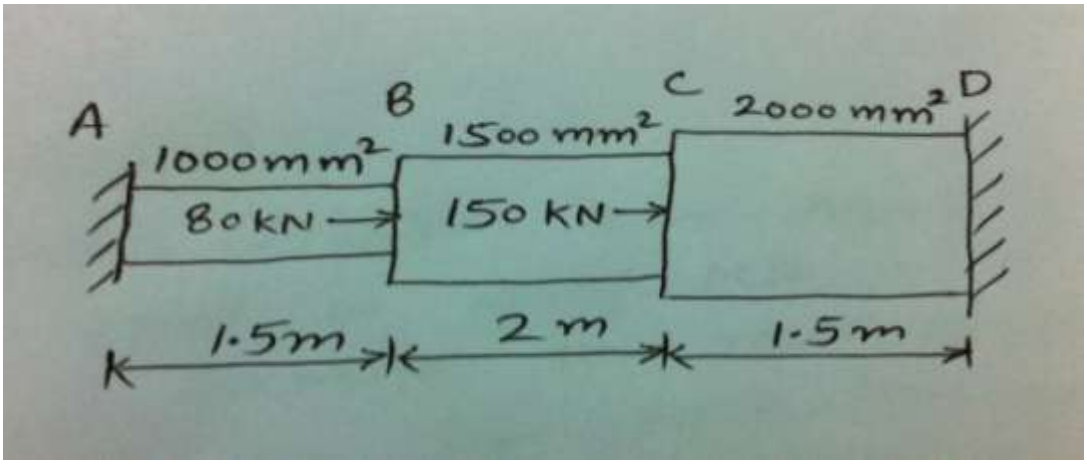
Question Bank for B.Tech. III Sem.

Subject: SMMS-I (CE302)

UNIT-1

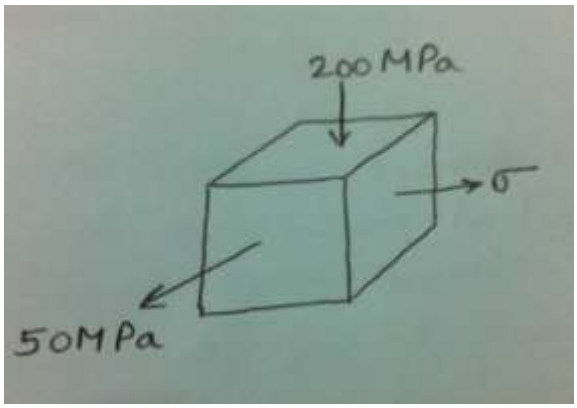
Q 1. A circular bar ABCD is rigidly fixed at A and D and is subjected to axial forces as shown in fig:. Determine the reactions, the forces in each portion of the bar and the displacement of point B and C.

Take E= 200 KN/mm^2.

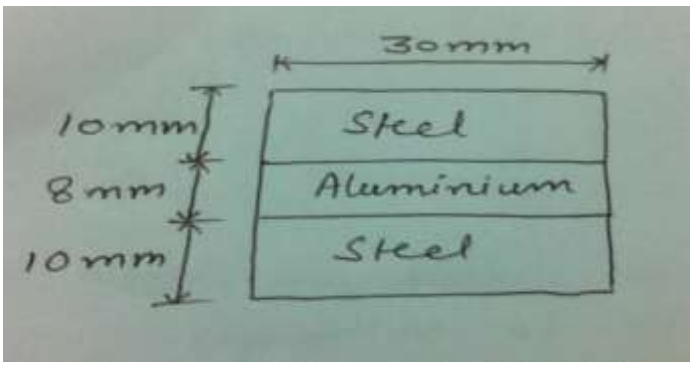


Q.2 Define Hooke's law use its application and derive the expression of volumetric strain in case of triaxial loading.

Q.3 Find magnitude of stress 'σ' if elastic cube as shown in fig:.

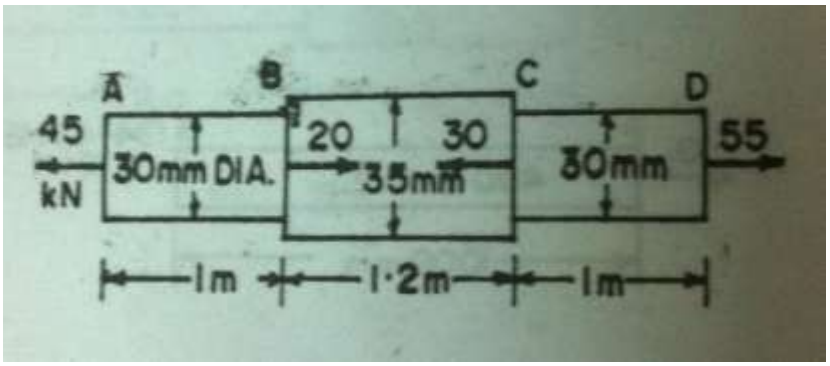


Q 4. A flat bar of Al alloy, 30 mm wide and 8 mm thick is placed between 2 steel bar each 30mm wide and 10 mm thick to form a composite bar 30mm*28mm as shown in fig. the 3 bars are fastened together at there ends when the temperature is 12°C. Find the stress in each of the material when the temperature of the whole assembly is raised to 42°C. If at the new temperature, a compressive load of 30 KN is applied to the composite bar, What are the final stresses in steel and Aluminum? Take $E_s = 2*10^5 N/mm^2$. $E_a = 0.7*10^5 N/mm^2$, $\alpha_s = 12*10^{-6}$ per°C, $\alpha_a = 23*10^{-6}$ per°C.



Q 5. Define elastic constant i.e young's modulus of elasticity, modulus of rigidity, bulk modulus, passion's ratio.Write any 2 relations between them?

Q 6.A circular steel bar of variable section is subjected to forces as shown in fig. Taking $E = 205 KN/mm^2$,determine the total elongation of the bar.



Q7.define : (i)modulus of elasticity

(ii)Poisson's ratio

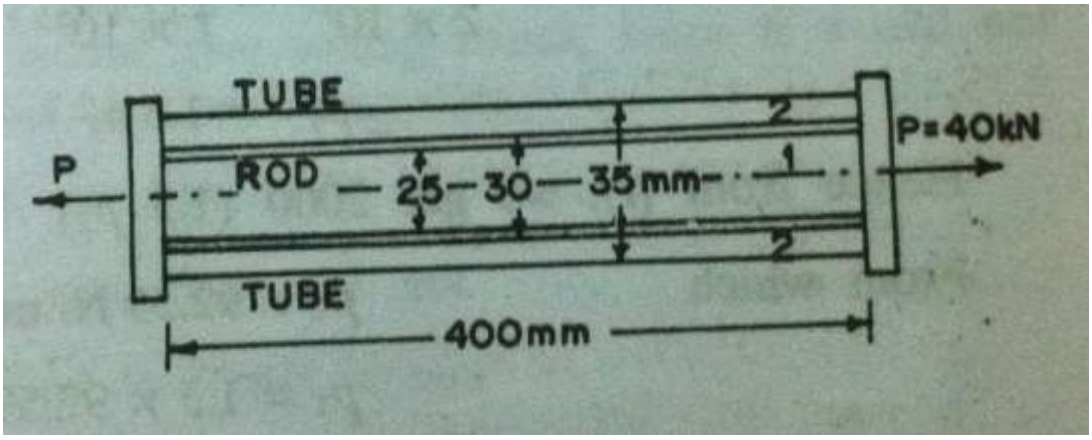
(iii)bulk modulus

(iv)modulus of rigidity.

Q8.A mild steel rod of 25 mm diameter and 400mm is enclosed centrally inside a hollow copper tube of external diameter 35mm and inside diameter30mm.The ends of the rod and tube are

rigidly attached, and the composite bar is subjected to an axial pull of 40 kN. Find the stress developed in the rod and the tube. Also find the extension of the rod.

E_{steel}=200KN/mm^2,E_{copper}=100KN/mm^2



Q.9 Derive an expression for the elongation of a tapered bar of length 'l', Whose diameter vary from d at one end to D at the other end, when subjected to an axial pull of T.

Q.10 A steel rod of 5 m long and 30 mm in diameter is subjected to an axial tensile load of 50 kN. Determine the change in length, diameter and change in volume of the rod. Take E = 2 X 10^5 N/mm^2 and poisson's ratio = 0.25.

UNIT-2

Q 1. Define principal planes and principal stresses. A rectangular bar of cross section area 12000 mm^2 is subjected to an axial load of 20 KN. Determine the normal and shear stress on a section plan which inclined at an angle of 30° with normal cross section of the bar.

Q 2. In a 2D problem the stresses at a point are 80MPa and 50 MPa both tensile acting on 2 mutually perpendicular planes in normal direction. If the major principal stress is limited to 120 MPa find out the shear stress on the planes., also Find the magnitude of minor principal stress, maximum shear stress and position of principal planes.

Q 3. At a point in a material, the stresses on two mutually perpendicular palnes are 50N/mm^2(tensile) and 30 N/mm^2(tensile).The shear stress across these planes is 12 N/mm^2. Using Mohr's circle,find magnitude and direction of the resultant stress on a plane of the first stress.Find also,the normal and tangential stress on this plane.

Q 4. A thin cylindrical shell has an internal diameter of 250 mm and is 6mm thick.Ift is subjected to an internal pressure of 3MN/m^2.Estimate the circumferential and longitudional stresses if the ends of cylindrical are closed.

Q.5 The principle tensile stresses at a point across two perpendicular planes are 80 N/mm^2 and 40 N/mm^2. Find the normal and tangential and the resultant stress and its obliquity on a plane at 20^0 with the major principle plane.

Q.6 Briefly explain principle stresses and principle planes.

Q.7 A material is subjected to tensile stress of 100 N/mm2 on one plane and tensile stress of 47 N/mm2 on a plane at right angle, together with shear stress of 63 N/mm2 on the same plane.Find the direction and magnitude of principal planes and the magnitude of maximum shear stress and its plane.

Q 8.A cylindrical shell 2m long and 90 cm internal diameter and 12mm metal thickness is subjected to an internal pressure of 1.6 N/mm^2. Determine

(a)Maximum intensity of shear stress

(b)Changes in the dimensions of the shell.

$E=2*10^5 N/mm^2$, $\mu=0.3$

Q 9.Derive the expression for longitudional stress and hoop stress for thin cylinder.

Q 10.A cast iron pipe of 320mm internal diameter and 80mm thickness carrying water under pressure of $8N/mm^2$.Calculate maximum and minimum circumferential stresses and sketch the distribution of circumferential and radial stresses across the thickness. Consider both ends of pipe are closed.

UNIT-3

Q 1.Define slenderness ratio and concept of effective length of a column for different end conditions.Find the Euler's Buckling load of a 1m long rectangular column of size 10mm*25mm with both ends hinged.Take $E=2*10^5 N/mm^2$

Q 2. Write assumptions of Euler's Buckling theory.

Q 3.A cast iron hollow cylindrical column of length 3m, external diameter 50mm and internal diameter 40mm in fixed at both its ends. Determine the crippling load using Rankine's formula. Take $f_c=550N/mm^2$ and Rankine's constant $\alpha=1/1600$. Compare this load with Euler's load for the same column.$E=95KN/mm^2$.

Q 4.Write limitations of Euler's Buckling theory.

Q 5.An I-section joist ISWB 400 and 8m long is used as a strut with both ends fixed. Taking $E=2*10^5 N/mm^2$, Determine Euler's buckling load.

Given for the section $I_{xx}=23426.7cm^4$ $I_{yy}=1388.0cm^4$

Q 6.Derive an expression for secant formula.

Q 7.Derive an expression for rankine's formula.

Q 8.Calculate Euler's critical stresses for a series of columns having slenderness ratio of 50,100,150,200,250 under the following conditions :

(a) Both ends hinged
(b) Both ends fixed.

Take $E=2*10^5 N/mm^2$

Q 9.A hollow alloy tube 6m long with external diameter of 50 mm and internal diameter of 30 mm is used as a strut with both ends pinned. Find the Euler's buckling load.

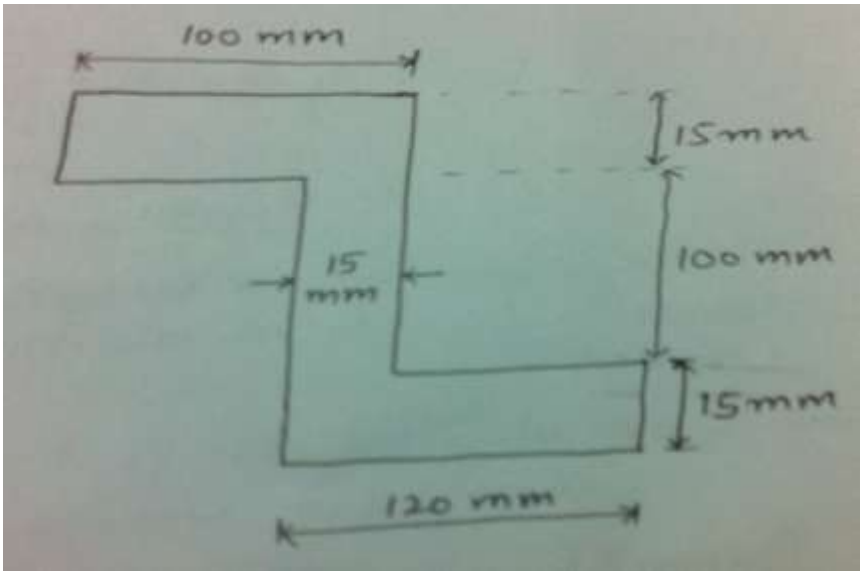
$E=0.8*10^5 N/mm^2$

Q 10.A cast iron hollow column, having 100mm external diameter and 80 mm internal diameter, is used as a column of 2.4 m length.Using Rankine's formula,determine the crippling load, when both ends are fixed.

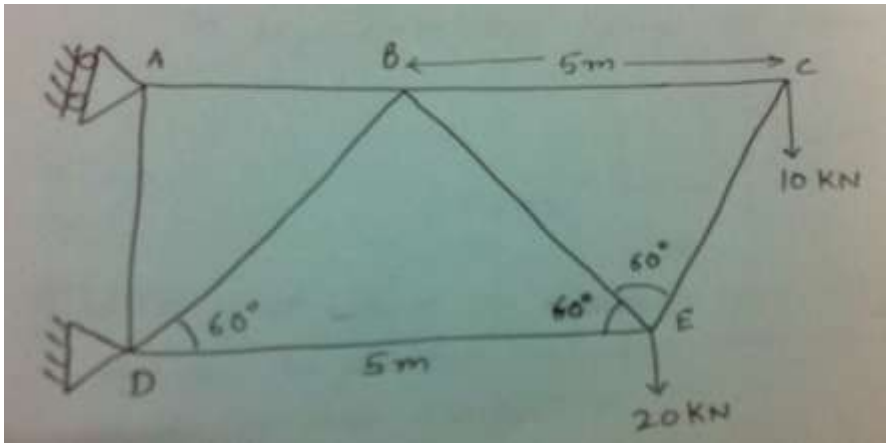
Take $f_c=600N/mm^2$ and Rankine's constant $\alpha=1/1600$

UNIT-4

Q 1.Find the centroid and Moment of Inertia of Z- section as shown in fig. about its both centroidal axes.

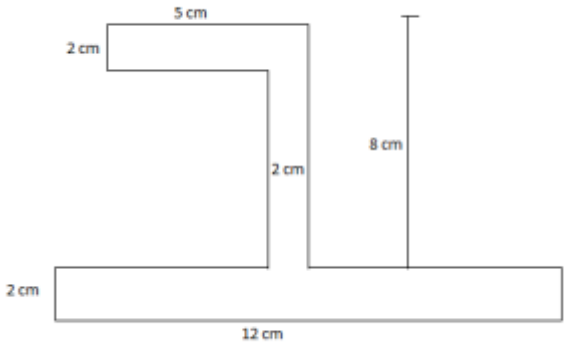


Q 2.Determine the forces in every member of the truss shown in fig.

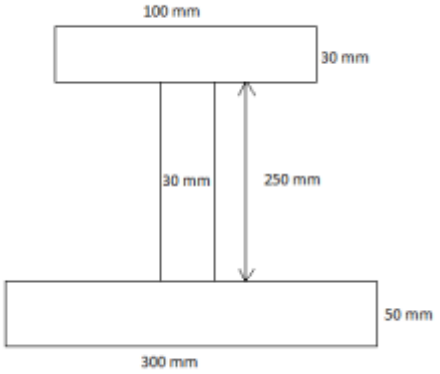


Q 3.Define centroid , moment of inertia and radius of gyration.

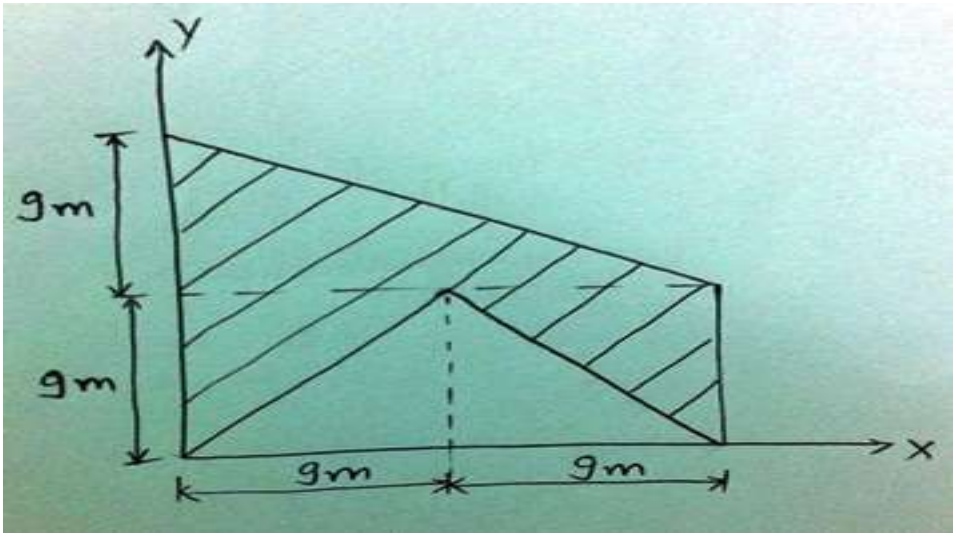
Q 4.Find the moment of inertia about the horizontal and vertical centroidal axes(I_{xx} and I_{yy}) for the section given in fig. below?



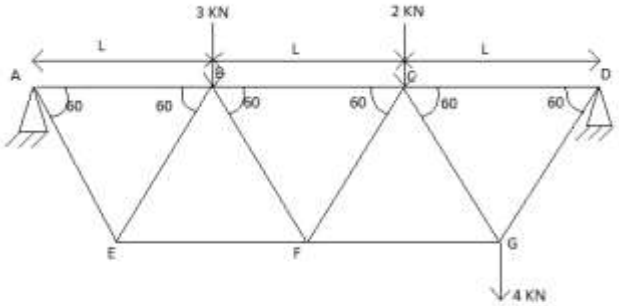
Q 5.Find the moment of inertia for I section shown in fig.



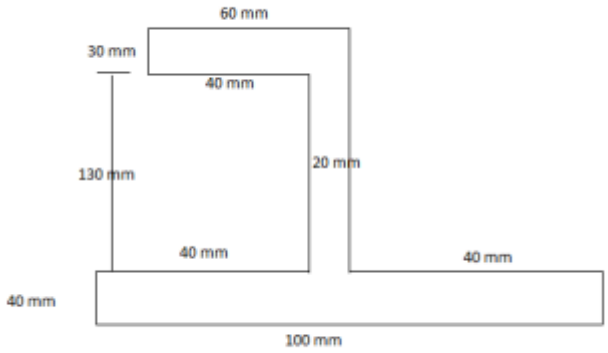
Q 6.Locate the centroid of the shaded area shown in fig.



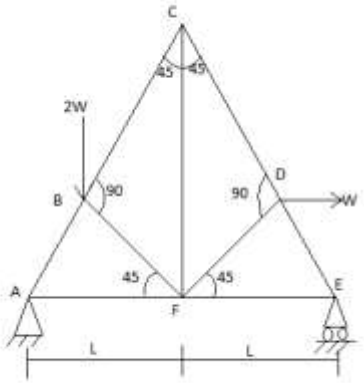
Q 7.Find the forces in the members BC,FB and EF of the truss loaded as shown in fig.



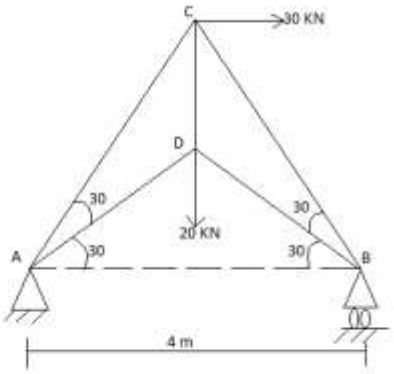
Q 8.Calculate the polar moment of inertia and product of inertia of the section about centroidal axes as shown in figure.



Q 9. A truss loaded as shown in fig. Determine the forces in all members of the truss by method of joints.

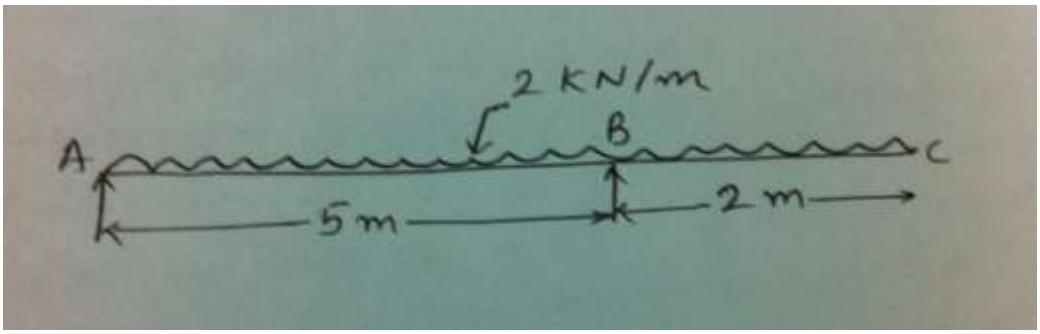


Q 10.Determine the forces in the member of the frame shown in fig.

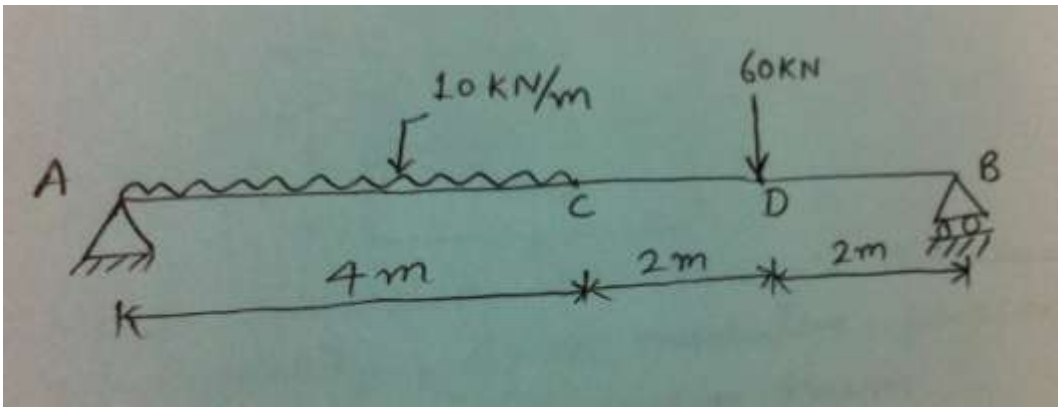


UNIT-5

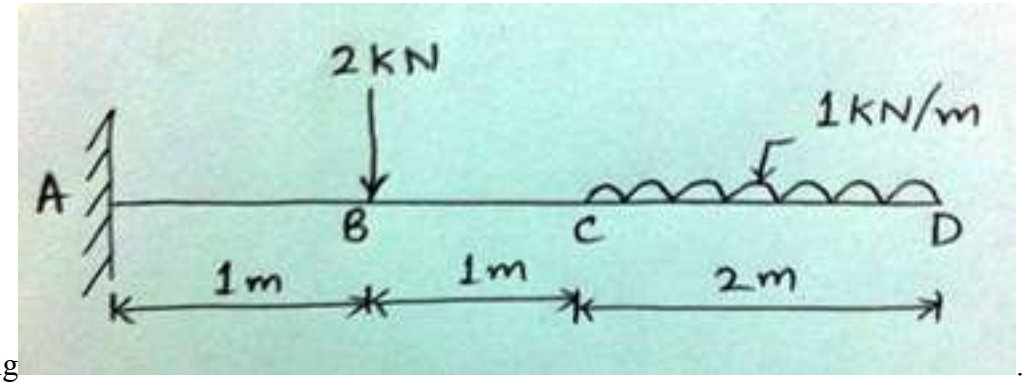
Q 1.Draw Shear force and Bending moment diagrams for a beam as shown in fig.



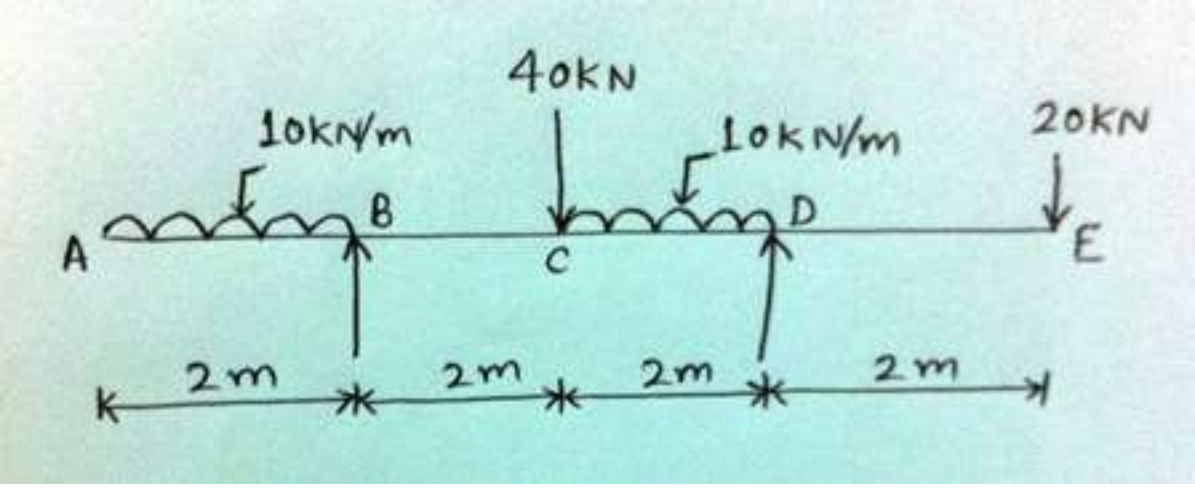
Q 2. Draw shear force and Bending moment diagrams for a beam shown in fig.



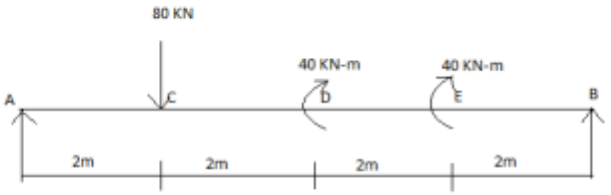
Q 3.Draw Shear force and bending moment diagram for the cantilever beam shown in fig.



Q 4.Draw shear force and bending moment diagram for overhang beam shown in fig.



Q 5.A beam AB,simply supported at the ends is loaded as shown in fig. Draw S.F and B.M diagrams.



Subject: Building Material and construction CE303

UNIT-1

Q. 1) Explain the classification and testing of bricks.

Q. 2) Describe the various methods of quarrying of stones.

Q. 3) Explain the manufacturing process of bricks.

Q. 4) Explain the various tests for stones.

Q. 5) Explain the classification of stone.

Q. 6) Discuss the qualities of good building stone for masonry work.

Q. 7) Explain the uses of principal building stones.

Q. 8) What do you understand by dressing of stone? Describe the advantages of quarry dressing over site dressing.

Q. 9) Explain qualities of good bricks.

Q. 10) Explain the selection criteria of stones.

UNIT-2

Q. 1) Discuss various types of cement.

Q. 2) Explain the manufacturing process of cement.

Q. 3) Describe the initial and final setting time test on cement.

Q. 4) What do you mean by normal consistency? What is the significance? How is it tested?

Q. 5) How is lime classified according to IS specification? Describe their characteristics.

Q. 6) What are the sources of lime? Compare fat lime with hydraulic lime.

Q. 7) Write short notes on:

a) Rapid hardening cement.
b) Quick setting cement.

Q. 8) Describe the field tests for cement.

Q. 9) Write the manufacturing process of hydraulic lime.

Q. 10) Describe the rotary kiln, used in manufacture of ordinary port land cement.

UNIT-3

Q. 1) Enumerate various defects in timber and explain it.

Q. 2) Explain prestressed and precast concrete.

Q. 3) Explain various methods of seasoning.

Q. 4) Explain the detail about plywood.

Q. 5) Explain the seasoning of timber.

Q. 6) Write general properties of plastics.

Q. 7) Write short notes on:

a) Aluminum
b) Various types of paints

Q. 8) Write the properties and uses of glass.

Q. 9) (a) Explain defects in timber and also write uses of timber and plastic

(b) Explain properties of steel and types of steel and also rust free steel.

Q. 10) What are concrete making materials and what are composite and smart materials?

UNIT-4

Q. 1) Name the various types of foundations.

Q. 2) Draw sketches for foundation for black cottan soil.

Q. 3) Write the methods of finding the bearing capacity of soil.

Q. 4) Write a note on various building components and their function.

Q. 5) What are the cause of failure of foundation? What remedial measure would you adopt?

Q. 6) Discuss the classification of building by occupancy.

Q. 7) Explain grillage footing along with sketch.

Q. 8) Discuss the classification of building on the basis of type of construction.

Q. 9) Explain bearing capacity of soil and methods for determining the bearing capacity.

Q. 10) Describe the various types of foundations. What are the causes of failure of foundations? What measures are to be taken to prevent such failures?

UNIT-5

Q. 1) Explain the following terms

a) Centering
b) Load bearing capacity

Q. 2) Explain pitched roof and its various parts.

Q. 3) Describe:

(a) Types of doors and functional requirement.

(b) Construction of terrazzo and marble floor

(c) Staircase and their parts

Q. 4) Write short notes on Pitched roof and its various parts

Q. 5) Write short notes on Masonry arches and their various component parts.

Q. 6) Write short notes on Dormer window, bay window, skylight.

Q. 7) Write short notes on Types of doors and functional requirement.

Q. 8) Write short notes on Construction of terrazzo and marble floor.

Q. 9) Write short notes on Staircase and their parts.

Q. 10) Explain the following terms

a) Superstructure
b) Formwork

JAGAN NATH UNIVERSITY

Subject: Engineering Geology(CE304)

UNIT 1:

Q1:

a. Give a suitable definition of geology?
b. Explain major branches of geology
c. What are the scopes of Geology in civil engineering?

Q2:

a. Explain petrology, mineralogy, structural geology?
b. How geology is used in rural and urban planning's?
c. How geology is used in water exploration?

Q3:

a. What is the Internal Structure of the Earth?
b. How the structure of earth is determined?
c. What is moronic discontinuity?

Q4:

a. Explain core of earth with its physical and chemical constituents.
b. Explain mantle of earth with its physical and chemical constituents.
c. Explain crust of earth with its physical and chemical constituents.

Q5:

a. What is weathering?
b. What are different types of weathering?
c. What structures forms due to wind erosions?

Q6:

a. What are the geological works of natural agencies?
b. What are different phenomenons's of work of wind?
c. What types of structural features forms due to work of river?

Q6:

a. What is the geological work of River?
b. What are different phenomenons's involved in work of rivers?
c. What types of structures forms due to work of river?

Q7:

A. What is the geological work of wind?
B. What are different phenomenons's of work of wind?
C. What types of structural features forms due to work of river?

Q8:

a. What is Geological Time Scale?
b. How geological time scale is studied?
c. What information can be obtained from geological time scale? Explain in detail.

Q9:

a. What are various Physical Properties of Minerals?
b. What is the need of determine physical properties of minerals?
c. What are the various classifications of minerals?

Q10:

a. Explain the definition of mineral.
b. What are the basic structures of minerals?
c. What are the various classifications of minerals?

Unit 2

Q1:

A. What do you mean by rock?
B. What are different types to rocks?
C. Give some examples of each type of rocks with thierexplanations.

Q2:

a. How igneous rocks were formed?
b. What are classifications of igneous rocks?
c. Explain examples of igneous rocks.

Q3:

a. How sedimentary rocks were formed?
b. What are classifications of sedimentary rocks?
c. Explain examples of sedimentary rocks.

Q4:

a. How metamorphic rocks were formed?
b. What are classifications of metamorphic rocks?
c. Explain examples of sedimentary rocks

Q5:

a. Explain various textures of igneous rocks.
b. Explain various structures of igneous rocks.
c. What are the physical significances of structures and textures found in igneous rocks?

Q6:

a. Explain various textures of sedimentary rocks.
b. Explain various structures of sedimentary rocks.

c. What are the physical significances of structures and textures found in sedimentary rocks?

Q7:

a. Explain various textures of metamorphic rocks.
b. Explain various structures of metamorphic rocks.
c. What are the physical significances of structures and textures found in metamorphic rocks?

Q8:

a. What are different Engineering Properties of Rocks for Building & Road Material?
b. Explain Strength properties of rocks in detail.
c. Explain point load indexes for rocks

Q9:

a. Explain different types of Laboratory tests carried out at site of construction.
b. Explain different types Field Test carried out at Site of Construction.
c. Explain point load indexes for rocks

Q10:

a. Explain compressive and tensile tests for rock materials.
b. Explain different types Field Test carried out at Site of Construction
c. Explain different types of erosion tests of road materials.

UNIT 3:

Q1.

A. What are the Folds in rocks?

B. Explain their Causes of formation.

C. Explain the various types found in folds

Q2.

a. Explain various terminology used in structural geology
b. Explain their engineering significance.
c. What terminology will give information about the folds in rocks?

Q3.

a. What ate the Joints in rocks?
b. Explain their Causes
c. Explain the types of joints

Q4:

a. What are the Faults in rocks?
b. Explain their Causes
c. Explain the types of faults

Q5:

a. What are the unconformities in rocks?
b. Explain their Causes
c. Explain the types of unconformities in rocks?

Q6.

a. Explain various terminology used in faults and
b. Explain various terminology joints of rocks
c. Explain their engineering significance.

Q7:

a. What types of structural features are found in rocks?
b. What is dip in rocks
c. What is strike?

Q8:

A. What are the unconformities in rocks?
B. What terminology will give information about the folds in rocks?
C. What types of structural features are found in rocks?

Q9:

a. What is dip in rocks
b. What is strike?
c. How dip and strike is measured?

Q10:

a. What is Joints in rocks? Explain their types.
b. What is Folds in rocks? Explain their types.
c. What is Faults in rocks? Explain their types.

UNIT 4:

Q1:

a. What are types of geophysical methods used for exploration works?
b. What is bore hole methods used for exploration works
c. Explain basic principle of Electric resistivity method used for exploration works

Q2:

a. What is electrical resistivity method used for surface exploration in civil engineering projects?
b. How data is gathered in electrical resistivity methods.

c. How final conclusion is drawn for subsurface exploration by electrical resistivity method.
Q3:

a. How geophysical methods are more suitable compare to bore hole method for subsurface exploration. Explain in detail.
b. What is seismic method used for surface exploration in civil engineering projects?
c. What are the types of seismic method used for surface exploration in civil engineering projects
Q4:

a. What are the different fields of exploration where geophysical methods are used?
b. What is seismic refraction method used for surface exploration in civil engineering projects.
c. How data is captured in the seismic refraction method used for surface exploration in civil engineering projects
Q5:

a. Why geological investigations are required before site selection.
b. Explain in brief about Dam and its types.
c. What are different Types of Geological consideration are considered for site selection of Dam?
Q6:

a. Why geological investigations are carried out for tunnel works?
b. What are the basis types and purposes of tunnel?
c. What Types of Geological considerations are considered for site selection of tunnel?
Q7:

a. What is Electrical Resistivity Methods
b. What is Seismic wave method?
c. What is Data processing in Electrical resistivity method?
Q8:

a. How electrical resistivity method is used for exploration of subsurface of soil?
b. How data processing is done in Electrical resistivity method?
c. What is Seismic wave method?
Q9:

a. How subsurface exploration is done for soil?
b. What is the difference between exploration of soil and rocks?
c. What methods are used for exploration work?
Q10: A. what parameters are required for site selection of dam?

B. What parameters are required for site selection of tunnel?

C. What parameters are required for site selection of Bridge?

UNIT 5

Q1:

a. Define Remote Sensing
b. What are the various components of remote sensing?
c. How remote sensing is classified?

Q2:

a. What are the various types of remote sensing's?
b. How remote sensing works?
c. Explain Electromagnetic wave and radiation pattern.

Q3:

a. What are the passive and active remote sensing's?
b. What different types of platforms are used for remote sensing?
c. What are the Sensor's Characteristics?

Q4:

a. What types of remote sensing sensors are used in remote sensing?
b. What different types of platforms are used for remote sensing?
c. Explain Electromagnetic wave and radiation pattern

Q5:

a. What are the different types of remote sensing platforms used?
b. How remote sensing is classified?
c. What are the various types of remote sensing's?

Q6:

a. What is the nature of Electromagnetic Radiation?
b. What is thermal remote sensing?
c. What is microwave remote sensing?

Q7:

a. What is an electromagnetic spectrum?
b. What is atmospheric window?
c. Define GIS.

Q8:

a. How energy Interact with Earth's Surface Materials?
b. What are the different components of GIS?
c. How Remote sensing is active part of GIS

Q9:

a. What are the different components of GIS?
b. What are the applications of GIS in civil engineering
c. What are the application of remote sensing in civil engineering

Q10:

a. what are the advantages of Remote sensing in Various fields of Civil Engineering,
b. What are the advantages GIS in Various fields of Civil Engineering?
c. What are the Limitations of Remote Sensing and GIS in Various fields of Civil Engineering?

Subject: soil mechanics (CE305)

UNIT-1

1.

(a) Why should a civil engineer study soil mechanics ?

(b)Represent soil as a three phase system and use it to deriverelation between porosity and void ratio.

2. What are the various transported soils and state its transporting agency and give examples of transported soils

3. obtain the relationship among the water content, void ratio, specific gravity and degree of saturation.

4.An undisturbed sample of soil has volume of 100 cm^3 & mass of 190 gm, on oven drying for 24 hours the mass is reduced to 160 gm if the specific gravity of grains is 2.68,determine the water content ,void ratio & degree of saturation.

5.Describe the process of soil formation and state the factors that affect weathering.

6. A soil sample whose water content is 20% has a bulk unit weight of 21.6KN/m^3. The sample undergoes air drying with an insignificant change in thevoid ratio. What is the water content of this sample when its bulk unit weightis reduced to 20.0 KN/m^3?

7.Explain the terms with the help of three-phase diagram,

(a)void ratio

(b)degree of saturation

(c)water content

(d)bulk unitweight.

8. Draw neat sketch for three phase soil system. Write the
Expressions for the following terms,
(d void ratio
(6) Porosity

(c) Degree of saturation
(d) Air content
(e) Percentage air voids
(f) Water content.

9.A soil sample in its undisturbed state was found to have volumeof l05 cm^3 and mass of 201 gm.After oven drying the mass got reduced to 168 gm. Compute:
(1) Water content
(2) Void ratio
(3) Porosity
(4) Degree of saturation
(5) Air content
If G = 2.7

10. Define the following :

(a) Terminology of soil

(b) Origin of soil

(c) Major soil deposits in India

UNIT-2

1. What are the various index properties of soil? Explain thesignificance of each

2.Statedifferent methods to find water content of a given soil with their suitability to differenttypes of soil

3.An oven dried soil having a mass of 200 gm is placed in a pycnometer which is than completely filled with water .the total mass of pycnometer with water & soil inside is 1605 gm. the pycnometer filled with water alone has a mass of 1480 gm. calculate specific gravity of soil

4. Explain the methods for particle size distribution.

5...Drawa typical particle size distribution curves for well graded , uniformly graded & gap graded soils.

6.State Stoke's law and explain its limitations as applicable to the sedimentation analysis

7. How can we determine specific gravity of soil in the laboratory ? Explain

8. Discuss the significant of density index and consistency index

9.The grading curve of a soil gives the effective size as0.16 mm, D30 = 0.4 mm and D60 = 0.3 mm. Find Cu andCc &Classify the soil.

10. Define consistency of soils and show the states of consistencygraphically with appropriate consistency limits.

UNIT-3

1. Describe I.S. Classification of soils

2. Write a short note on Highway Research Board(H.R.B) classification of soil

3. Describe textural classification system

4. Write a short note on unified soil classification system

5. Write a short note on MIT system of soil

6. Explain International classification of soil

UNIT-4

1. What is Darcy's law of permeability of soiland under what conditions it is valid.

2. What is flow net? Write down the properties of flow net?

3. Draw the sketch showing portion of flow net ?

4.What is permeability of soil? Discuss the factors that influence the value of permeability of soil.

5 .What are the harmful effect of seepage? Write down the ways to minimize it.

6. Write a short on effective stress under seepage condition.

7 Describe various clay minerals?

8. What do you understand by "Quick sand" ?

9. Explain stress distribution in soils

10. Thecoefficient of permeability of a soil sample is found to be $1*10^{-3}$ cm/sec at a void ratio of 0.4. Estimate its permeability at a void ratio of 0.6

UNIT-5

1. Explain capillary phenomenon in soils ?

2. Define compaction in soil mass?

3. Write down the effect of compaction onengineering properties of clay .

4. State the necessity of compaction of soil.

5.What is consolidation of soil?

6Write down the difference b/w compaction and consolidation?

7. Write a short note on the settlement of soil.

8. Compute the height of capillary rise in a soil whose D10 is 0.1 mm & void ratio is 0.60.

9. Define geostatic stress in Brief ?

10. when water at 20^0c added to a fine sand & to a silt, a difference in capillary rise of 25 cm is observed b/w the two soils. If the capillary rise in fine sand is 25 cm .calculate the difference in the size of voids of the two soils.

Subject: Fluid Mechanics CE306

UNIT I

Q.1 Explain the term Viscosity of a fluid and differentiate between Newtonian and Non-Newtonian fluids. Define Kinematic Viscosity and write its units

Q2.If the velocity distribution over a plate is given by: $u = 2y/3 - y^{2,}$, in which u is the velocity in m/sec.at a distance y metres above the plate, determine the shear stress at y= 0 and y= 0.15m. Take dynamic viscosity = 0.863 Ns/m^2.

Q3 Briefly explain the phenomenon of surface tension and capillarity.

Q4 Define and differentiate between: Solids and fluids, ideal and real fluids, Specific gravity,specific weight and specific volume.

Q5 Find out expressions for pressure intensity inside a droplet and a soap babble.

Q6 A liquid compressed in a cylinder has a volume of $0.0113m^3$ at $6.87x10^6$ NK/m^2 pressure and a volume of $0.0112m^3$ at $13.73x10^6$ pressures. What is its bulk modulus of elasticity.

Q7 Explain the following:

(i) Rheology and Rheological diagram

(ii) Newtonian and non Newtonian fluids

(iii) Solids and Fluids

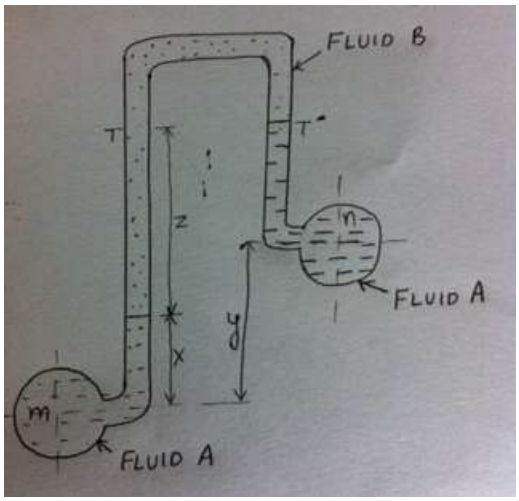
(iv) Liquids and gases

(v) Pressure and vapour pressure

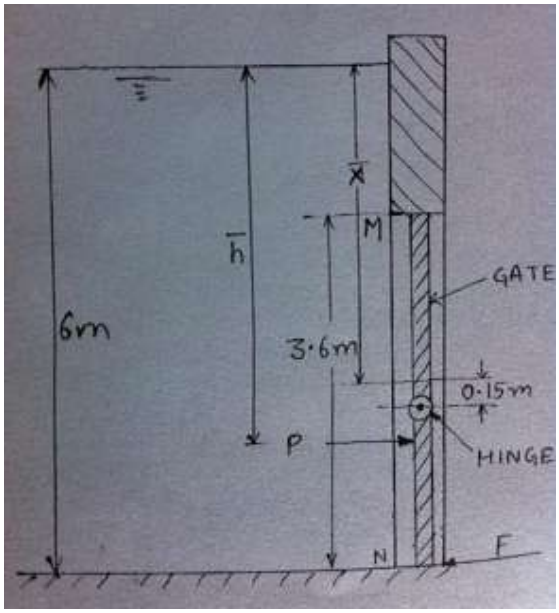
(vi) Viscosity

(vii) Specific gravity, specific weight and sp. Volume

Q8 . In the accompanying figure fluid A is water, fluid B is oil of specific gravity 0.85, z= 0.7m and y=1.5 m. Compute pressure difference between m and n.



Q9 A 3.6m by 1.5 m wide rectangular gate MN is vertical and is hinged at point 0.15 m below the cetre of gravity of the gate. The total depth of water is 6m. What horizontal force must be applied at the bottom of the gate to keep the gate closed.



Q10. Calculate the capillary effect in mm in a glass tube 3mm in diameter when immersed in (a) water (b) mercury. Both the liquids are at 20°C and the values of the surface tensions for water and mercury at 20°C in contact with air are respectively 0.0736 N/m and 0.51 N/m. contact angle for water =0° and for mercury = 130°.

UNIT II

Q.1 Explains the terms:-

(i) Force of buoyancy and centre of buoyancy.
(ii) Metacentre and Metacentric height.

Q2. Prove that the pressure is the same in all directions at a point in a static fluid.

Q3 A rectangular plate of size 25 cm by 50 cm and weighing 25kg(f) slides down 30°incined surfaces at a uniform velocity of 2 m/sec. if the uniform 2 mm gap between the plate and the inclined surface is filled with oil determine the viscosity of the oil.

Q4 On a line diagram, show the relationship between absolute pressure,gauge pressure and vacuum pressure in fluids.

Q5 Draw a diagram of differential manometer connecting two points of a pipeline in which a fluid is flowing. Taking suitable fluid properties and properties of manometer liquid, write expressions for pressure difference between these two points.

Q6 A rectangular plane area, immersed in water is 1.5m by 1.8m with the 1.5 m side horizontal and 1.8 m side vertical. Determine the magnitude of the force on one side and the depth of its centre of pressure if the top edge is (a) on the water surface (b) 1 m below the water surface.

Q7 Explain the various devices adopted for measuring fluid pressure.

Q8 Find out an expression for the variation of pressure in a fluid at rest which holds for both compressible and incompressible fluids.

Q9 How do you represent the principle of floation through its mathematical values.

Q10 A wooden cylinder of diameter d and length 2d floats in water with its axis vertical. Is the equilibrium stable? Locate the metacentre gravits of wood is 0.6.

UNIT III

Q1 (a) Explain:

(i) Vortex flow

(ii) Forced Vortex flow

(iii) Free Vortex flow

Q2 Differentiate between:

(i) Rotational and Irrotational flow

(ii) Compressible and incompressible flow

(iii) Uniform ad non uniform flow

(iv) Steady and unsteady flow

Q3 If :

$$v = -3z^2 y - 2y^2 \quad and$$
$$w = z^3 - 4xz + 2yz$$

Determine the value of u. Determine whether the velocity system satisfy the continuity equation.

Q4 The potential function for a flow is known as $\phi = 12xy - 16x$. Determine the stream function for the flow. Also calculate the value of ψ *at* (2, 3)

Q5 Explain and differentiate between:

(I) Streamlines and pathlines

(II) Stream function and potential function

Q 6 The stream function for a flow is given by the equation: $x^3 - 3xy^2$, determine the corresponding potential function for this flow. Find out whether continuity equation is satisfied or not.

Q7 The velocity component, u, in X direction in a two dimensional fluid flow is:

$$u = y^3/3 - x^2y + 2x$$

Determine the component of velocity in y direction for a possible flow.

Q8 What is meant by one dimensional two dimensional and three dimensional flow.

Q9 Describe the use and limitations of flow nets.

Q10 Discuss briefly the different methods of drawing the flow nets.

UNIT IV

Q.1 A tap discharges water evenly in a diameter of the jet at this point being 15mm. The jet flows down vertically in a smooth stream. Determine the velocity and the diameter of the jet at 0.6m below the tap outlet.

Q2 Discuss the forms of energy encountered in a fluid flow alongwith the method of calculation of their numerical values.

Q3 Water flow at the rate of 600 L/s through a horizontal venturimeter with diameters 0.5m and 0.245m. The pressure gauge fitted at the entry to the venturimeter reads 2 bars. Determine the throat pressure. Barometric pressure is 1 bar.

Q4 An orificemeter of 5cm diameter is inserted in a pipe of 12 cm diameter. The reading of differential manometer fixed to the meter shows a deflection of 20 cm of mercury. If $C_d = 0.64$, determine the flow rate. Take sp. Gravity for mercury as 13.6 and for oil flowing in pipe, sp. Gravity = 0.84.

Q5 A 0.3 m diameter pipe carries water at a velocity of 24.4 m/sec.The pressure at a point A is 361KN/m^2 and this point is 30.5 m above the datum line.The pressure at another point B, which is 33.5 m above datum line is 288 KN/m^2. Find the loss of head between A and B.

Q6 What are orifices and mouth pieces? Define various coefficients of an orifice. Explain the method of determination of any one of the coefficients.

Q7 A Venturimeter having throat diameter of 75 mm is installed in a horizontal pipe of diameter 150mm carrying water.The difference of pressure head at the inlet and throat of the venturimeter recorded by a manometer is 175 mm of mercury.Determine the discharge through the pipe.Take the coefficient of discharge of the meter as 0.97.

Q8 What is the function of a Pitot tube? Draw a neat sketch of a Pitot static tube and define static and stagnation pressures.Write the equation for this tube.

Q9 Derive Linear Momentum Equation.

Q10. Derive Bernoulli's equation from general energy equation.

UNIT V

Q.1 Draw hydraulic gradient and energy lines for a pipe in which a fluid is flowing at a velocity v under a pressure p.Also define these lines.Show the loss of head also on this diagram and write down Darcy Weisbach equation for loss of head defining each term of the equation.

Q2 What do you mean by Minor Losses in pipes? Derive an expression for the loss of head due to sudden contraction in a pipe.

Q3 Water is discharged from a reservoir into the atmosphere through a 40 m long pipe. The whole length of the pipe is divided into two parts connected in series. The diameter of first 15 m length of pipe is 50mm connected at the entrance of the reservoir.The pipe then enlarges suddenly to 75 mm diameter for the remaining 25 m length.The discharge in the pipe is 10 litres/sec.The friction factor for the first pipe is 0.02 and for second pipe is 0.025.Determine the difference of level between the water surface in the reservoir and pipe exit.

Q4 Derive an expression for Darcy – Weisbach equation for calculating pressure drop.

Q5 Oil of density of 850Kg/m^3 and viscosity of 0.9 poise flows through a pipe of 150 mm dia. The flow was measured as 200 kg in 35 seconds. Calculate the pressure drop in 15m length.

Q6 Explain the terms hydraulic gradient and total energy lines.

Q7 A main pipe line carrying water at the rate of 2.5 m^3/s has to be divided into two pipes of diameters 0.9m and 0.6m and then joined back after a length of 1800m. The friction factor for both pipes is 0.018. Calculate the flow in each line.

Q8 Obtain the condition for maximum efficiency in transmission of power through a pipeline.

Q9 Why is the pipes connected in parallel.

Q10. What are the different losses in pipe? Define briefly with expressions.

Subject: Structural Analysis (CE 402)

UNIT – 1

Q1) A fix beam of span 7 m is carrying two point loads of 10kN and 20 kN at 2 m and 3 m from left hand support. Draw SFD and BMD of the beam.

Q2) Derive the expression to calculate fixed end moment in a fixed beam due to a UDL over whole span.

Q3) A fixed beam of span 4 m carries UDL of intensity 15kN /m up to mid span. Calculate the fixed end moment and draw BMD.

Q4) Derive the expression to calculate fixed end moment in a fixed beam due to a point load at mid span.

Q5) Determine the fixed end moment of a beam (9m) are subjected to a UDL of 5kN /m, Point load 15 kN and 10kN which acts 3m,5m and 7m respectively from left end. Draw SFD and BMD.

Q6) Draw SF and BM diagrams of a continuous beam ABC having span length AB=4m and BC=4m .The span AB is carrying a point load of 20kN at a distance 1 m from support A. The span BC carries a UDL of intensity 8kN/m.

Q7) Draw SF and BM diagram of continuous beam ABCD having span length AB=3m, BC=4m and CD =3m.The span AB carrying a point load of 3kN at mid span. The span BC carries a UDL of intensity 5kN/m. The span CD carrying a point load 8kN at mid span.

Q8) Draw SF and BM diagram of continuous beam ABCD having span length AB=4m, BC=5m and CD =3m.The span AB carrying a point load of 3kN at mid span. The span BC carrying a point load 8kN at mid span. The span CD carries a UDL of intensity 5kN/m.

Q9) Draw SF and BM diagrams of a continuous beam ABC having span length AB=6m and BC=4m .The span AB carries a UDL of intensity 8kN/m. The span BC is carrying a point load of 20kN at a distance 1 m from support C.

Q10) Analyze the fixed beam having 6m span and 10kN/m UDL at whole span.

UNIT - 2

Q1) Define section modulus of a beam section.

Q2) A composite beam is made by placing two steel plates, 12 mm thick and 240 mm deep, one each on both sides of a wooden section 90 mm wide, and 240 mm deep. Determine the moment of resistance of the section of the beam. Given the ratio between modulus of elasticity of steel and wood $E_s/E_w = 15$, the stress in wood should not exceed 7 N/mm^2.

Q3) Explain assumptions made in Theory of Simple Bending

Q4) A simply supported beam of rectangular cross section of dimension 150x300 mm is having span of 4.5 m. It is loaded with U.D.I of 8 KN-m compute:

(i) Shear stress developed on a layer 60 mm above the natural axis of a section located at 1.5m from the left support.
(ii) Maximum shear stress on the support at neutral axis.

Q5) Derive the relation

$$\frac{M}{I} = \frac{f}{y} = \frac{F}{R}$$

Q6) Derive an expression to determine shear stress distribution in the I section.

Q7) A beam 500mm deep of a symmetrical section has I= 1x10^8 mm^4 and is simply supported over a span of 10m.Calculate the maximum banding stress if the beam carries a central point load of 25 kN.

Q8) A beam 800mm deep of a symmetrical section has I= 1x10^8 mm^4 and is simply supported over a span of 10m. Calculate the uniformly distributed load; it may carry if the maximum bending stress is not to exceed 150 N/mm^2.

Q9) A beam of I-section is 250 mm deep and 200 mm wide. The flanges are 25 mm thick while the web thickness is 15mm.At the cross section of beam, the bending moment is M and the shear

force is Q, Calculate the proportions in which the flanges and the web resist M and Q respectively.

Q10) Differentiate between Symmetrical and Unsymmetrical section.

UNIT – 3

Q 1) Derive the differential equation of a deflected beam as given by E I $\frac{dy}{dx^2}$ = M

Where M is bending moment, E is Young's Modulus of Elasticity and I is Moment of Inertia.

Q 2) Discuss the suitability of various methods for finding the slope and deflection of beams.

Q3) Sate the basic assumptions made in the theory of bending.

Q4) A beam of uniform Rectangular section 200 mm wide and 300 mm deep is simply supported at its ends .If carries a U.D.L. Of 9kN/m Run over the entire span of 5 m. If the value of E for beam material is 1x 10^4 N/m m^2 using double Integration Method

Find:

1. Slope at the supports
2. Maximum deflection

Q5) A simply supported beam AB of span 5m has an over hang BC (1m length) on one side. The beam supports a concentrated load of 20 kN at free End C of overhang. Calculate the slope of the beam at A and B using Macaulay's Method only. (EI= 2x10^{12} Nmm^2)

Q6) Describe the Macaulay's Method to find the slope and deflection of beam.

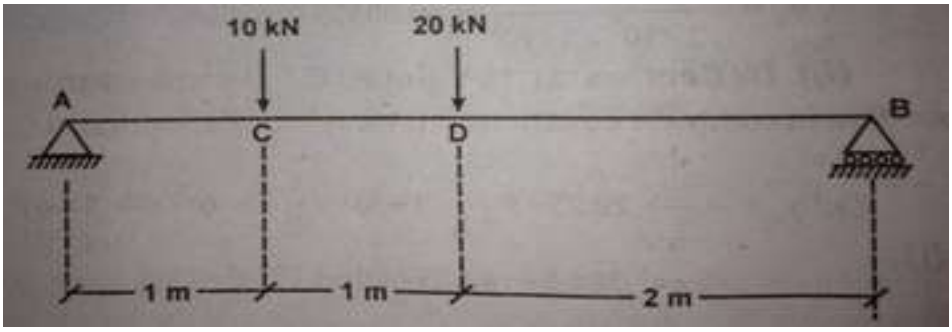
Q7) A horizontal beam of uniform section and 6m long is simply supported at its ends. Two vertical concentrated loads of 48 kN and 40kN at 1 m and 3 m respectively from the left hand support. Determine the position and magnitude of Max deflection using Macaulay's Method.

Take E= 200x10^3 N/mm^2 and I=85x10^4 mm^4

Q8) A simply supported beam of length 4 m and cross section 200mm x 400mm is loaded as shown in figure.

Find:

1. Deflection under the point loads
2. Location and magnitude of maximum deflection.
   Take E =$2x10^5$ N/mm^2



Q9) Consider an aluminium cantilever beam 1600 mm long with a 10kN force applied 400 mm from the free hand. Find the deflection and rotation of the free hand. Take E=70 GPa and I= $85x10^4$ mm^4

Q10) A horizontal beam AB is simply supported at A and B, 6 m apart. The beam is subjected to a clockwise couple of 300kNm at a distance of 4 m from the left end.
Take E=$2x10^5$ N/mm^2 and I= $2x10^2$ mm^4
Find :

1. Deflection at the point where couple is acting and
2. The maximum Deflection

UNIT - 4

Q1) A solid shaft is subjected to a torque of 100Nm. Find the necessary shaft diameter if the allowable shear stress is 100N/mm^2 and angle of twist is 3^0.

Take C=$1x10^5$ N/mm^2.Use length of shaft as 10 diameter.

Q2)Derive expression to calculate deflection in a close coiled helical spring subjected to axial load.

Q3)A circular steel shaft of 100mm diameter and 1m length is carrying a torsion of 12 KN-m. Determine the maximum shear stress and the rate of twisting in the shaft.

Q4) Derive an expression for the distribution of the shear stress in a solid circular shaft.

Q5)A closely coiled spring is made of steel wire of diameter 4mm.The average diameter of spring is 100mm .Determine the stiffness of spring .

Take C=82 GPa and n=10.

Q6) Derive the expression for the distribution of a shear stress in a hollow circular shaft.

Q7) Derive the relation for the solid circular shaft:

$$\frac{T}{J} = \frac{\tau}{R} = \frac{N\theta}{l}$$

Q8) Laminated spring is 800mm long is made of 12 leaves of the same thickness and 40mm wide. Find the thickness of leaves if the bending stress is to be 200N/mm^2, and the spring is subjected to a point load 6kN at its centre also find the central deflection.
Take E=2x10^5 N/mm^2

Q9)A leaf spring carries a central load of 3000N.The leaf spring is to be made of 10 steel plate 5cm wide and 6 cm thick. If the bending stress is 150N/mm^2, Determine the length of spring and deflection at the centre of the spring.
Take E=2x10^5 N/mm^2

Q10) A shaft of 2m length is required to be transmit 500kW power at 120 rpm from one end to other. The angle of twist should be 2^0 and the maximum allowable stress in the shaft is 90 N/mm^2.Find the external diameter of circular shaft. The ratio of inner diameter to outer diameter is 0.5.
Take C=0.8x10^5 N/mm^2

UNIT – 5

Q1) Derive the equation of motion for structural system with viscous damping.

Q2) Explain the D Alembert's principals. Explain its application.

Q3) What is amplitude of motion.

Q4) Write a short note on critical Damping.

Q5) Write a short note on Logarithmic Decrement.

Q6) What do you understand by Degree of Freedom?

Q7) Derive the relationship between amplitude of Displacement and Acceleration.

Q8) What is the relation between Frequency and Period of Motion?

Q9) Define the following:
(i)Natural Time Period
(ii)Resonance
(iii)Simple Harmonic Motion

Q10) Write a short note on Over Damping.

Subject: Hydraulics & Hydraulic Machines (CE403)

UNIT-1

Q.1 Give the complete classification of types of flows in open channels with their definition.

Q.2 Define prismatic and non-prismatic channels.

Q.3 Draw a trapezoidal channel section and write and define all the geometric parameters of this channel.

Q.4 What do you mean by Most Economical or most efficient section of a channel?

Q.5 Define specific energy in a channel. Draw specific energy diagrams and show all the parameters on the diagram. Define alternate depths.

Q.6 Derive equations for critical depth, minimum specific energy and maximum discharge in a rectangular channel.

Q.7 Write down uses and types of Hydraulic jumps. What are the various equations relating depths of flow before and after the jump, Froude Numbers, height and length of jump and energy loss in jump.

Q.8 Write a brief note on Gradually Varied flow in channels.

Q.9 A trapezoidal Channel has bottom width of 2.5m and side slope of 2V:3H. It carries a discharge of 10 cumec at depth of 1.2M. If n = 0.03, find bed slope.

Q.10 A discharge of 16.5 cumec. Flows in a channel of width 5.5M at a depth of 1.5M. Find critical depth, specific energy, Froude No., minimum specific energy and type of flow.

UNIT-2

Q. 1. Define – Dimensional Analysis and Dimensional Homogenity.

Q. 2. What are the uses and applications of dimensional analysis?

Q. 3. Explain the terms – Fundamental Units and Derived or Secondary Units with examples. Explain the two methods of carrying out dimensional analysis with their silent features.

Q. 4. What is Hydraulic Similitude? Write its applications.

Q. 5. Name and explain different types of hydraulic similarities that must exist between model and prototypes.

Q. 6. Derive the various dimensionless numbers in terms of the force ratios for dynamic similarity.

Q. 7. Describe various model laws with their significance and improtance in model studies.

Q. 8. Explain the terms – undistorted models and distorted models.

Q. 9. How are the distorted models useful? Give examples.

Q.10. How are the repeating variables selected for dimensional analysis?

UNIT-3

Q.1 Derive a general expression for velocity distribution for laminar flow in a circular pipe. Draw shear stress and velocity distribution diagrams.

Q.2 What is Hagen Poiseuille equation for laminar flow in circular pipe? Derive an expression for friction factor from this equation.

Q.3 An oil of density 1200Kg/m^3 and viscosity 20cP flows through a 2.5cm pipe 250m long.

Find: (a) what is the maximum flow in m^3/s so that the flow remains laminar. Take maximum value of Reynold's no. for laminar flow=2000.

(b) What would be the pressure drop for this flow?

Q.4 An oil of viscosity 10 poise and sp.gr. 0.6 flows through a pipe of 30mm dia. If the pressure drop in 50 m length of pipe is 3000 KN/sq.m, determine; rate of flow, type of flow, centerline velocity, wall shear stress, head loss due to friction and power required to maintain the flow.

Q.5 An oil of density 876Kg/m^3 and viscosity 0.24 Ns/ m^2 flows through a pipe of dia. 1.5cm. The pressure difference between two points 25m apart is 47KPa. Find discharge in pipe when (a) pipe is horizental (b) inclined 8 degrees upward (c) 8 degrees downward.

Q.6 Derive a general expression for laminar flow between two parallel plates. From this equation, derive equations for velowcity distribution, discharge and shear stress for Coutte flow. What is simple Coutte flow?

Q.7 For laminar flow of an oil between two parallel plates 8cm apart, max velocity = 1.5m/s, viscosity=20 poise. Find discharge q, shear stress at plate, pressure difference between two points 25m apart, velocity at 2cm from plate, velocity gradient at plate end.

Q.8 For laminar flow between two plates 10mm apart, lower plate is fixed and upper plate moves at 1m/s in flow direction, sp.gr. Of oil=0.9, viscosity=1 poise, difference between two points 100m apart=98.1 KN/sq.m. Find shear stress on upper plate, discharge, velocity distribution equation.

Q.9 An oil of sp.gr. 0.85 and viscosity 1.2 poise flows ina 0.1 m dia pipe having a downward slope of 1 in 100. Q=2 lit./s. Find pressure difference for two points 200m apart.

Q.10 An oil of sp.gr. 0.9 and viscosity 1.5 poise is flowing in a vertical pipe of 20mm dia. Pressure at a lower point in pipe is 58.86 N/sq. Cm and at a higher point 20 m from lower point is 19.62 N/sq.cm. Find direction of flow.

UNIT-4

Q.1 Write important characteristics of turbulent flow.

Q.2 Draw the graph showing lower and upper critical velocities in turbulent flow in pipes. Define the terms: Magnitude of turbulence and intensity of turbulence.

Q.3 Name and discuss the various statistical theories for determining shear stresses in turbulent flow.

Q.4 Derive an expression for universal velocity distribution for turbulent flow in pipes, using Prandti's mixing length theory.

Q.5 Write a detailed note on hydrodynamically smooth and rough boundaries.

Q.6 In turbulent flow in a rough pipe of 150mm dia, the centerline velocity is 2.5m/s and local velocity at middle of radius is 2.28m/s. Find discharge and average height of roughness projections.

Q.7 When 0.28 cumecs of water flows in a 300mm pipe, 63 KW power is lost in friction. Calculate head loss due to friction, friction factor f, friction velowcity (or shear velocity), shear stress at pipe wall.

Q.8 A 300mm dia. rough pipe carries liquid at a velocity of 3.5m/s. Kinematic viscosity of liquid is 0.8cS and density=998kg/met. Cube. If friction factor is 0.028, calculate; (a) average height of roughness projections (b) wall shear stress (c) shear stress and velocity at 50mm from pipe axis.

Q.9 In a smooth pipe of dia. 0.5m and length 1000m, water is flowing at a rate of 0.5 cumecs. Kinematic viscosity=0.02 stokes. Find head loss due to friction, wall shear stress, maximum velocity, thickness of laminar sublayer.

Q.10 Find out the distance from pipe wall at which local velocity is equal to average velocity for turbulent flow.

UNIT-5

Q.1 Define Hydraulic Machines. What is the difference between a Turbine and a Pump?

Q.2 Draw general layouts of Hydro – Electric Power Plant and write names of various units on these diagrams.

Q.3 Draw neat diagrams of (a) Reaction turbine and (b) Pelton wheel and write down names of all the parts on these diagrams.

Q.4 Give complete classification of various types of turbines along with the names of turbines.

Q.5 What are the main functions of a draft tube in turbines? Name the various types of draft tubes.

Q.6 Derive an expression for the efficiency of a draft tube.

Q.7 Define specific speed of a turbine and a centrifugal pump. What is its significance?

Q.8 Define various efficiencies of the turbines.

Q.9 Draw a neat sketch of a centrifugal pump and write down the names of all the components on it. Write a note on various type of pump cassings.

Q.10 Define various heads and efficiencies of a centrifugal pump. Also define specific speed of a centrifugal pump.

Subject: Modern Concrete Technology (CE 404)

UNIT-1

Q 1.Discuss creep of concrete and factors influencing it.

Q 2.Discuss “flow ability” of concrete and its method of determining with figure .

Q 3.Define mix design of concrete. Discuss factors affecting mix design.

Q 4.Discuss briefly :

(i) Compaction factor test for concrete
(ii) Creep and shrinkage of concrete

Q5.What do you understand by Grade of concrete. Name them and explain the importance of water/cement ratio and its role in design of concrete mix design.

Q 6.With the help of neat sketch describe the drying shrinkage phenomenon. Also, discuss the factors affecting the drying shrinkage.

Q 7.Discuss "permeability" of concrete and factors influencing it.

Q 8.Describe standard test procedure as per the IS code for compressive strength test for compressive strength test of hardened concrete . How is the size of specimen related with maximum size of aggregate in concrete?

Q 9.Explain:
(a)Aggregate crushing value
(b)Flakiness index of aggregate

Q 10.Explain Ready Mix concrete. How it is prepared.

UNIT-2

Q 1.(a)Write short notes on the following:
(i) Automatic batching plant
(ii) Curing compounds
(iii)High strength concrete

Q 2. Difference between volume batching and weigh batching and their relative merits.

Q 3. Differentiate between Retarder and Accelerator admixtures and write their applications. Describe Air-entraining admixture in detail.

Q 4. Describe advantages of use of fly ash in concrete and precautions while its use in concrete.

Q 5.Explain various methods of mixing of ingredients of concrete.

Q 6.Discuss briefly :
(i) Methods of compaction
(ii) Importance of curing for concrete

Q 7.What are the types of batching? Discuss advantage of weigh batching for preparation of concrete.

Q 8. Explain different techniques of vibration of concrete. What is the objective of vibration of concrete?

Q 9. Write short notes on Super Plasticizers.

Q 10. Define high strength concrete. Discuss briefly its properties and applications.

UNIT- 3

Q 1.Describe the requirements of good form work. Draw the neat labeled sketch of form work for "beam-slab" construction.

Q 2. Describe the causes of dampness in a building. With the help of neat sketch describe the damp proofing of basement.

Q 3.Differentiate between scaffolding and shoring. With the help of neat sketch describe the "Underpinning" in detail.

Q 4.Write short note on the following:

(i) Sequence of construction activity
(ii) Anti-termite treatment
(iii)Setting out and marking of foundation plan

Q 5.Discuss causes of dampness in buildings.

Q 6.Describe effects of dampness in buildings.

Q 7.Describe methods and materials for anti-termite treatment in buildings in detail.

Q 8. Discuss dewatering of foundation.

Q 9.Discuss:

(i) Types of shoring
(ii) Methods of underpinning

Q 10.Discuss different types of scaffoldings.

UNIT-4

Q 1.Draw a neat labeled sketch of the semi-circular masonry arch.

Q 2.Describe the types of stair-case and their suitability.

Q 3.Describe requirements of good staircase and suitability of different types of stairs for different types of buildings. Explain with figures.

Q 4.Describe requirements , types and construction details along with materials used in joints.

Q 5.Describe types of arches and their construction details.

Q 6.Descrie types of lintels and their construction features.

Q 7.Discuss the advantages and disadvantages of prefabricated construction.

Q 8.Describe requirements of good staircase.

Q 9.What are the functions of arches and lintels? Discuss merits of lintels over arches.

Q 10.Explain briefly advantages of multi-storey building frames.

UNIT-5

Q 1.Describe the factors to be considered in the selection of type of construction for upper floor in a building.

Q 2.Draw the neat line diagram showing showing at least four types of pitched roof. Also labeled these sketches.

Q 3.Name the types of roof covering for pitched roof. Describe any one of them with the help of neat sketch.

Q 4.Discuss constructions details of good ground and upper floors with figures highlighting differences.

Q 5.Discuss construction details of terrazzo flooring including curing, grinding and finishing.

Q 6.Explain king post roof truss construction details with figure.

Q 7.Explain the labeling details in a figure of steel roof truss.

Q 8.Discuss merits and demerits of concrete flooring in ground floors.

Q 9.Describe roof covering materials for pitched roofs.

Q 10. How roofs may be classified? Describe with examples and figures.

Subject: Surveying-I (CE 405)

UNIT1

Q1) Explain the principal of surveying?

Q2) Explain the basic methods for locating a point in surveying?

Q3) Explain the various types of chains and tapes used in measurement

Q4) What are the corrections done in tape measurement

Q5) Explain the difference between the prismatic and surveyor's Compass.

Q6) Explain field problems in distance measurement.

Q7) write any 10 conventional signs.

Q8) what are the sources of error and precautions

Q9) Write the differences between Plane and geodetic surveying.

Q10) Explain the following (i) main survey line

(ii) Check line

(iii) Tie line

UNIT 2

Q1) Difference between whole circle bearing and reduced bearing of line with example.

Q2) Draw a neat sketch of vernier thedolite and explain the function of its various components.

Q3) Difference between transiting and swinging of the telescope

Q4) What do you understand by temporary adjustments. Describe briefly temporary adjustments

Q5) Explain the difference between prismatic compass and surveyors compass.

Q6) Explain in different steps how will u measure the horizontal angle by method of repetition

Q7) Define the different types of bearings and meridians.

Q8) Explain various instrumental errors in theodolite.

Q9) What do you understand by magnetic declination. What are the different types of variations which takes place in magnitude of declination.

Q10) The following were the fore bearing and back bearing observed in a closed traversing with a compass where local attraction was suspected.

Line	FB	BB
AB	71º05'	250º20'
BC	110º20'	292º35'
CD	161º35'	341º45'
DE	220º50'	40º45'
EA	300º50'	121º 10'

Determine the corrected F.B and B.B.

UNIT 3

Q1) Give brief detail about Chain Traverse and Compass Traverse

Q2) Differentiate between chain and compass survey

Q3) Explain any one method each for adjustment of traverse at the site and at the office

Q4) What is a traverse? Discuss the purpose of traverse.

Q5) Write short notes on:

(a) Bowditch's method.

(b) Graphical method.

(c) Transit method of traverse balancing.

Q6) What do you mean by balancing of traverse? Discuss briefly any two methods.

Q7) Explain the traversing by fast needle method.

Q8) Explain gales traverse table.

Q9) Explain briefly axis method with neat sketch.

Q10) Explain back bearing method of traversing.

UNIT 4

Q1) Explain the working of a dumpy level and a titling level

Q2) What do you understand by reciprocal leveling?

Q3) Briefly explain the temporary and permanent adjustments done in Dumpy and Tilting levels.

Q4) Explain various types of sources of errors in leveling

Q5) How a horizontal surface is different from level surface? Define datum, bench mark, reduced level.

Q6) Discuss the effects of curvature and refraction in leveling. And the correction due to each and combined correction.

Q7) Write short notes on (i) profile leveling

(ii) cross sectioning

(iii) spirit leveling.

Q8) Explain the following terms used in leveling (i) turning point(ii) height of the instrument.

Q9) The following are the readings observed successively with a leveling instrument. The instrument was shifted after fifth and eleventh reading.

0.585, 1.010, 1.735, 3.295, 3.775, 0.350, 1.300, 1.795, 2.575, 3.375, 3.895, 1.735, 0.635, 1.605m. Draw up a page of level book and find R.L of various points if R.L of the point on which 1st heading taken is 136.440

Q10) Explain how the reciprocal leveling is carried out. And also explain where it is useful.

UNIT 5

Q1) Define contour and contour interval. Write the Characteristics of contours

Q2) What is resection? Describe any two methods of resection.

Q3) Explain methods for locating Contours in an undulated area.

Q4) Explain the procedure of Plane Table Survey giving details about various instruments used.

Q5) What do you understand by two point problem? Explain how it is performed in field.

Q6) How will you prepare contour map by indirect method.

Q7) Write short notes on uses of contour map.

Q8) What errors will occur in plane table survey due to imperfection in instruments and manipulation in sighting?

Q9) What are the suggested values of contour interval for different works?

Q10) What is contour interval and contour gradient?

Subject: Geo-Technical Engineering (CE406)

UNIT 1

Q 1: Explain the factors affecting permeability of soils?

Q 2: Describe various clay minerals?

Q 3: Describe the various soil structure?

Q 4: How do you determine the permeability of stratified soils? Explain with derivations?

Q 5: Explain Darcy's law of permeability of soil and its validity?

Q 6: Explain various laboratory methods for determination of permeability?

Q 7: How permeability of soil is measured in field? Explain.

Q 8: In order to determine the field permeability of a free aquifer, pumping out test was performed following observations were made:

Diameter of well =20cm. Discharge from the well = 240 m^3/ hour

R.L. of original water surface, before pumping started = 240.5 m

R.L. of water in the well at constant pumping = 235.6 m

R.L. of impervious layer = 210 m

R.L. of water in observation well = 239.8 m

Radial distance of observation well from the tube well = 50m.

Calculate k. Also calculate:

(i) the error in k if observation are not taken in the observation well and the radius of influence is assumed to be 300m.

(ii) actual radius of influence based on the observations of observation well.

Q 9:Calculate the coefficient of permeability of a soil sample, 6cm in height and 50 cm^2 in cross-section area, if a quantity of water equal to 430 ml passed down in 10 minutes, under an effective constant head of 40 cm.

On oven- drying, the test specimen has mass of 498 gm. Taking the specific gravity of soil as 2.65, calculate the seepage velocity of water during the test.

Q 10: (i)Explain capillary phenomenon in soils.

(ii) The capillary rise in soil A with D_{10} = 0.06 mm is 60 cm. Estimate the capillary rise in soil B with D_{10} = 0.1 mm, assuming the same voids ratio in both the soils.

UNIT 2

Q 1: A 8m thick stiff clay (У= 19 KN/m^3) is underlain by a layer of sand. The sand is in artesian pressure of 5m. Calculate the maximum depth of cut that can be made without causing heave?

Q 2: Explain : (i) The principle of drainage by electro-osmosis.

(ii) Piping.

Q 3: Derive Laplace's equation for 2-D flow through soil medium?

Q 4: (a) Compute total,effective and pore water at a depth of 15m below the bottom of a lake 6m deep. The bottom of lake is consisting of soil clay with a thickness of more than 15m. The average water content of the clay is 40% with specific gravity of 2.65.

(b) What do you understand by "Quick sand "?

Q 5:What is critical hydraulic gradient? Determine critical hydraulic gradient of a sand deposit of specific gravity 2.6 and a void ratio of 0.57?

Q 6: Write a short note on effective stress under seepage condition?

Q 7: Explain effective and neutral pressures?

Q 8: The water table in a certain area is at a depth of 4m below the ground surface. To a depth of 12m, The soil consists of very fine sad having an average voids ratio of 0.7. Above the water table the sand has an average degree of saturation of 50%. Calculate the effective pressure on a horizontal plane at a depth 10m below the ground surface. What will be the increase in the effective pressure if the soil gets saturated by capillarity upto a height of 1m above the water table? Assume G=2.65.

Q 9: The water table in a deposit of sand 8m thick, is a depth of 3m below the surface. Above the water table, the sand is saturated with capillary water. The bulk density of sand is 19.62 kN/m^3 . Calculate the effective pressure at 1m, 3m and 8m below the surface. Hence plot the variation of total pressure, neutral pressure and effective pressure over the depth of 8m.

Q 10: (i) What is Flow net?

(ii) Explain various methods for construction of flow nets?

(iii) What are the various applications of the flow net?

UNIT 3

Q 1: Write a short note on unconfined compressive test of soil?

Q 2: The stresses at failure on the failure plane in a cohesionless soil mass were: shear stress = $4kN/m^2$, normal stress = $10kN/m^2$. Determine the resultant stress on the failure plane, the angle of internal friction of the soil and the angle of inclination of the failure plane to the major principal plane?

Q 3: Explain the concept of Mohr's circle and give its importance?

Q 4: Explain Mohr-Coulomb theory of shear strength?

Q 5: Explain triaxial test briefly?

Q 6: (i) Explain direct shear test?

(ii) Write short on advantages and limitations of direct shear test?

Q 7: (i) Define principal planes and principal stresses?

(ii) What do you understand by shear strength of soil?

Q 8: Explain stress-strain behavior of sands and clays?

Q 9: The stresses acting on the plane of maximum shearing stress through a given point in sand are as follows: total normal stress $250kN/m^2$; pore-water pressure = $88.5kN/m^2$; shearing stress= $85kN/m^2$. Failure is occurring in the region surrounding the point. Determine the major and minor principal effective stresses. The normal effective stress and shearing stress on the plan of failure and the friction angle of the sand. Define clearly the terms plan of maximum shearing stress and plan of failure in relation to the Mohr's rupture diagram?

Q 10: A cylindrical specimen of dry sand was tested in a triaxial test.

Failure occurred under a cell pressure of $1.2kg/cm^2$ and at a deviator stress of $4kg/cm^2$.

(i) What is the angle of shearing resistance of the soil?

(ii) What were the normal and shear stresses on the failure plane?

(iii) What angle did the failure plane make with minor principal plane?

(iv) What was the maximum shear stress on any plane in the specimen at the instant of failure and how was the plane?

UNIT-4

Q 1. What do you understand by placement water content? Explainit's significance.

Q 2. Define: Maximum dry density and optimum water content .Also explain the effect of heavy compaction on dry density and moisture content.

Q 3. Describe the effect of adding lime to soil on various engineering properties of the soil. Describe the process of lime soil stabilization in field.

Q 4. A soil in the borrow pit is at a dry density of 17 KN/m^3 with moisture content of 10% .The soil is excavated from this pit and compacted in an embankment to a dry density of 18 KN/m^3 with moisture content of 15%.Compute the quantity of soil to be excavated from the borrow pit and the amount of water to be added for $100m^3$of compacted soil in the embankment.

Q 5. A laboratory compaction test on soil having specific gravity equal to 2.68 gave a maximum dry density of $1.82g/cm^3$ and a water content of 17%. Determine the degree of saturation, air content & percentage air voids at the maximum dry density. What would be theoretical maximum dry density.What would be theoretical maximum dry density corresponding to zero air void at the optimum water content?

Q 6. Explain the effect of compaction on engineering properties of clay.

Q 7.Write a short note on Method of compaction used in field.

Q 8. Write a short note on control of compaction in the field.

Q 9. Describe various Factors affecting compaction of soil.

Q 10. Describe standard and modified proctor test.

Q 11. Write a short note on the following:

-Lime stabilization

-Mechanical stabilization

-Bitumen stabilization

UNIT- 5

Q 1. What is consolidation of soil? Write down the difference b/w compaction and consolidation?

Q 2. Explain the process of consolidation by "spring analogy"

Q 3. Explain Normally, Over and Under consolidated soil.

Q 4. Explain the theory of one dimensional consolidation developed by terzaghi.?

Q 5. Two clay specimen A& B of thickness 2cm and 3cm having equilibrium void ratio 0.68 and 0.72 respectively under a pressure of 200 KN/m^2. if the equilibrium voidratio of two soil reduced to 0.50 and 0.62 respectively when the pressure was increased to 400 KN/m^2 find the ratio of coefficients of permeability of the two specimens, the time required by the specimen a to reach 40% degree of consolidation is ¼ of that required by specimen B for reaching 40% degree of consolidation

Q 6. Explain the laboratory consolidation test in detail.

Q 7. Writedown the methods to obtain coefficients of consolidation.

Q 8.An undistributed sample of clay 24 mm thick, consolidated 50% in 20 minutes, when tested in the laboratory with drainage allowed at top and bottom. Theclaylayer, from which the sample was obtained, is 4 m thick in the field. How much time will it take to consolidate 50%, with double drainage? If the clay stratum has only single drainage, calculate the time to consolidate 50%. Assume uniform distribution of consolidation pressure.

Q 9.The time to reach 60% consolidation is 30 seconds for a sample of 1 cm thick, tested in the laboratory under condition of double drainage. How many years will the corresponding layer in nature require to reach the same degree of saturation if it is 10 m thick and drained on one side only?

Q 10. Write short note on following:-

(i)Total and differential settlement

(ii) Coefficient of compressibility

(iii)Coefficient of volume compressibility

Subject: Transportation Engineering-I (CE 501)

UNIT 1

Q 1.Define the role of C.R.F, I.R.C, C.R.R.I and N.H.A.I, in road development of India.

Q 2.Explain in brief studies which are carried out during the planning survey.

Q 3.Explain the characteristic of road transport.

Q 4.Explain with sketches Macadam, Telford type road instruction.

Q 5.Compute the length of roads in different categories if the area of the region is $00000 km sq, the number of towns in the region are 200 and number of villages in the region are 38000.

Q 6.What are the main objectives of second twenty year plan i.e. Bombay plan?How the roads were classified according to this plan and how the length of NH can be found?

Q 7.Compare the Nagpur Road Plan and Bombay Road Plan in Tabular form.

Q 8.The following data were collected for Planning the road development programme of backward district:

Total area=9600 km^2

Agricultural and developed area=3200 km^2

Existing railway track length=105 km

Existing length of metalled road=322 km

Existing length of unmetalled road=450 km

Number of towns or villages in different population ranges are as below:

Population	No. of villages & Towns
>5000	8
2001-5000	40
1001-2000	130
501-1000	280
>500	590

Calculate the additional lengths of metalled and unmetalled roads for the road system based on Nagpur Road Plan formulate for this district.

Q 9.Enumerate the various mode of transportation and briefly compare them.

Q 10.Explain different types road patterns.

UNIT-2

Q 1.Enlist the various test on bituminous material. What are the desirable properties should possess a bitumen sample?

Q 2.Write construction steps required to construct a Water Bound Macadam(WBM) road.

Q 3.Explain different types of tests to be conducted on road aggregates to examine their different properties.

Q 4.Write step by step testing procedure that should be followed to find the grade of the bitumen.

Q 5.Write Construction steps for constructing a cement concrete road.

Q 6.Briefly explain the desirable properties of road aggregates.

Q 7.Explain how Impact test is carried in laboratory. What desirable property checked by this test?Also give the standard values for this property.

Q 8.Explain the difference between bitumen,tar and emulsions.

Q 9.Enumerate the properties of bitumen. Explain how ductility test is carried out and also discuss its importance and desirable values.

Q 10.Write desirable properties of soil to be used as subgrade in road construction. Enumerate different test to be conducted on soil sample.

UNIT-3

Q 1.Enlist the various cross section elements, Horizontal alignment and vertical alignment with respect to highway,geometric design.

Q 2.Calculate the safe O.S.D for a design speed of 100 kmph. Assume all other data suitably.

Q 3.Define the term:

(i) Extra widening at curves
(ii) Transition curve
(iii)O.S.D
(iv)S.S.D

Q 4.Explain the process for introducing super elevation in a horizontal curve in the field.
Q 5.Find the length of Transition curve with the following data:
Design speed=65kmph
Radius of circular curve=220m
Allowable rate of introduction of superelevation (pavement routed about the center line) 1 in 150.
Pavement width including extra widening=7.5m
Q 6.Define camber. List the factors that control the magnitude of camber maintained on a road. Give the standard design values for lateral coefficient of friction , longitudinal of friction and superelevation rate.
Q 7.Derive an expression for computing safe stopping sight distance (ssd) on aroad laid with a gradient.Compute overtaking sight distance (osd) for a two lane two way road laid in a plain terrain, if the design speed is 80 kmph, reaction time is 2.5 sec, and acceleration rate is 1.92 kmph per sec.
Q 8.Define types of gradients that may be used for roads under different conditions. What would be the compensated gradient if a road is laid with a grade of 4% and a horizontal curve of radius 300m? Design a vertical curve that would be formed by an upward grade of 2% that would satisfy two third of OSD as computed in the previous part of this question.
Q 9. A vertical summit curve is to be designed when two grades, +1/50 and -1/80 meet on a highway. The stopping sight distance and overtaking sight distance required are 180m and 640m, respectively. But due to site conditions the legth of vertical curve has to be restricted to a maximum value of 500m as possible. Calculate the legth of summit curve need to fulfill the requirements of (i)stopping sight distance (ii) overtaking sight distance oe at least intermediate sight distance and discuss the results.
Q 10.Explain total reaction time of driver and the factors on which it depends. Explain the 'PIEV' theory.

UNIT-4

Q 1.Enlist the various traffic studies carried out to analyze the traffic characterstic.
Q 2. What are the basic requirements of intersection at grade? Draw sketches of various forms of intersections.
Q 3.Discuss the importance of accidental study.
Q 4.Define types of traffic signs. Give schematic diagram with complete details of these signs and give at last two examples of each.
Q 5.Explain the significance of origin and destination study and how it is done.
Q 6.Write short notes on:
(i) Traffic signs
(ii) Spot speed by enoscope method
(iii)Road markings
Q 7.Enumerate different types of road intersections with neat sketches.

Q 8. What are the different methods for speed and delay study?

Q.9 What are the advantages of traffic signals?

Q.10 Write short notes on:

(a) Traffic signs

(b) Spot-speed by enoscope method.

(c) Road markings.

UNIT- 5

Q.1 Explain the general design considerations of a Rigid Pavement.

Q.2 What are the various flexible pavement design methods? Explain each one in brief.

Q.3 Define and differentiate between flexible pavement and rigid pavement.

Q.4 Give steps of IRC design procedure for flexible pavement.

Q.5 On what basis rigid pavements are designed? Explain the methods of computing concrete slab thickness.

Q.6 Write short note on CBR method of pavement design.

Q.7 Calculate the GI value of the soil subgrade whose results are as given below:

(i) Soil Portion passing 0.074 mm sieve = 50%

(ii) Liquid limit = 40%

(iii) Plastic limit = 20%

Q.8 Using westergaurd's modified equations determine the stresses in edge and corner regions of a 15 cm thick cement concrete slab for the following data:

(i) Design wheel load = 4100 kg

(ii) Radius of concrete area = 15 cm

(iii) Poisson's ratio = 0.5

(iv) Modulus of subgrade per = 3kg per cubic

Q.9 Discuss the factors to be considered in the design of flexible pavements.

Q.10 Write short note on :

Comparison of flexible and rigid pavements.

Subject: Water Resources Engineering CE502

UNIT- I

Q.1 Define irrigation, state the points to be considered while recommending the necessity of irrigation.

Q.2 What are the different types of sprinkler method of distribution of water. Describe briefly with a net sketch.
Q.3 What are the different types of irrigation efficiency.

Q.4 Determine the frequency of irrigation from the following data.
(I) Field capacity of soil=35%
(ii) Permanent wilting point=18%
(iii) Density of soil=1.5g/cm^3
(iv) Depth of root zone=70cm
(v) Daily consumptive use of water=17mm

Q.5 What is meant by the frequency of irrigation. Why is the frequency of irrigation ascertained for.

Q.6 What do you understand by consumptive use of water. Explain the methods to measure consumptive use of water.

Q.7 What are the methods to measure rainfall.

Q.8 A catchment has six raingauge stations. In a year the annual rainfall recorded by the gauges are as follws:-

Station	A	B	C	D	E	F
Rainfall(cm)	82.6	102.9	180.3	110.3	98.8	136.7

Q.9 Write a note on present status of irrigation in india.

Q.10 Define infiltration. What are the factors affecting infiltration.

UNIT 2

Q.1 What is meant by meandering of a river.How is it formed.

Q.2 Distinguish between the following

(a) Spur and Groyne

(b) Attracting groyne and repelling groyne.

(c) Turfing and riprap

Q.3 Describe a guide bank with a neat sketch..

Q.4 What are the different types of bank protection? Describe with a neat sketch.

Q.5 Discuss various regimes of flow. Also explain:

(i) Critical attractive forces

(ii) Bed load and suspended load

Q.6 Discuss the different stages of rivers. Explain meandering, aggradations and degradations. Discuss the need of bank protection .

Q.7 Write comparison between Spur and Groyne.

UNIT 3

Q.1 What is runoff? Describe the various factors that affect runoff.

Q2. List the different types of self recording rain gauges. Explain the working of any one of them with the help of neat sketches.

Q.3 What is Unit Hydrograph. Write the assumption and limitation of unit hydrograph theory.

Q4 Construct unit hydrograph from the data given below:

Hours. (12^{th} Aug.)	6.00	8.00	10.00	12.00	14.00	16.00	18.00	20.00	22.00
Total Q (m^3/s)	6	8	10	16	28	42	60	80	110
Hours. (13^{th} Aug.)	24.00	2.00	4.00	6.00	8.00	10.00	12.00	14.00	16.00
Total	18.00	20.00	22.00	24.0	2.00				
				14^{th} Aug.					
Total	11	9	8	7	6				

Q5 Explain Gumbel's Method of flood frequency analysis.

Q6 For a given basin the following are infiltration capacity rates at various time intervals after beginning of storm. Make a plot of Horton's curve and establish equation of the form of Historian type. Also, determine the total rain and excess rain.

Time (min)	1	2	3	4	5	6	8	10	12
Rainfall (cm/hrs)	5.5	5.5	5.5	5.5	5.5	7.5	7.5	7.5	7.5
Infiltration capacity (cm/hrs)	3.9	3.4	3.1	2.7	2.5	2.3	2.0	1.8	1.54

Time (min)	14	16	18	20	22	24	26	28	30
Rainfall (cm/hrs)	7.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Infiltration capacity (cm/hrs)	1.43	1.36	1.31	1.28	1.25	1.23	1.22	1.20	1.20

Q.7 Describe hydrological cycle. Describe 'catchment area' and ways to calculate it.

Q8 A catchment area has six rain gauge stations. In year the annual rainfall recorded by the gauges is as follows:

Station	P	Q	R	S	T	U
Rainfall(cm)	85.6	100.9	185.3	112.3	95.5	140.7

For a 10% error in the estimation of the mean rainfall, calculate the optimum number of stations in the catchment.

Q.9 Given the ordinates of a 4-h unit Hydrograph as below derive the ordinates of a 12-h unit hydrograph for the same catchment.

Time(h)	0	4	8	12	16	20	24	28	32	36	40	44
Ordinate of 4-h UH	0	20	80	130	150	130	90	52	27	15	5	0

Q.10 What is meant by Hydrologic cycle. Explain a neat sketch.

UNIT 4

Q.1 Classify various type of canal lining. Explain in detail.

Q2. Explain the procedure for designing an irrigation channel using Kennedy's theory.

Q3. Design an irrigation channel to carry a discharge of 8 cumec. Assume N=0.0025 and m=1. The channel has a bed slope of 0.2 m/km.

Q4 Describe the procedure for designing an irrigation channel using Lacey's theory. Explain with help of example.

Q5 Describe the different types of canals and compare them. Discuss the channel losses and ways to minimize them.

Q6 Explain the difference between Lacey's Theory and Kennedy's Theory.

Q7 Draw neat sketches of silt ejectors and silt excludes. Also, explain their functions

Q.8 What is balancing depth in a canal? Derive an expression for the same.

Q9. Design a channel section with the following data:-

(a) Full supply discharge =10 cumec
(b) Mean diameter of silt particles= 0.33mm
(c) Side slope=1/2:1
(d) Find also the bed slope of the channel.

Q10. Design a channel with the following data:-

(a) Full supply discharge=6 cumec
(b) Rugosity coefficient(N)=0.0225
(c) C.V.R.(m)= 1
(d) Bed slope=1 in 5000

Assume other reasonable data for the design.

UNIT 5

Q.1 What are the causes of water logging. Describe its preventive and corrective measures.

Q2.What do you understand by an open well and a tube well. Discuss various types of tube wells. Also, explain duty of well water.

Q.3. Describe the phenomena of water logging. What are its harmful effects?

Q4.Describe the ways to prevent water logging and corrective measures that can be undertaken.

Q5.Distinguish between open well and tube well. Describe the mechanisms of drawing water from them

Q.6 Describe the methods of water harvesting.

Q.7 Enumerate the process of reclamation of land effected by water logging?

Note:-As the content of Unit V and Unit II are very less in number, So only 7 questions are possible.

Subject: Design of Steel Structure-I (CE 503)

UNIT-I

Q. 1 What is steel structure and it's properties? Explain the structure steel sections.

Q.2 Describe the WSM and LSM? Explain about bolted and welded connections in brief.

Q.3 Explain definitions and specification as per code of following case-
(a) Bolted Connection
(b) Welded Connection

Q. 4 A single bolted lap joint is used to connect plates 12 mm thick. If 20 mm 4.6 grade bolts are used at 70 mm c/c. Determine the strength of joint and efficiency of the joint and steel is Fe 410.

Q. 5 Design a double cover butt joint to connect two plates 12 mm thick. The factored load to be transferred by the joint is 400 kN. Use 20 mm 4.6 grade bolts. The plates are of steel Fe 410.

Q. 6 Design the eccentric bolted connection for a ISHB 300 @ 577 N/m using 8 mm thick bracket plate. If P = 400 kN and e = 250 mm. Use M20 bolts of grade 4.6.

Q. 7 Find the safe load P carried by the joint. M 20 bolts of grade 4.6 provide at a pitch of 80 mm. The thickness of flange is 6.1 mm and that of the bracket plate is 8 mm. There are some data given below –

Gauge distance (g) = 120 mm;
Edge distance (e) = 40 mm;
No. of bolts in a line = 5;
No. of bolt line = 2

Q.8 Two 12 mm thick plates are joined by 160 mm long butt weld. Determine the strength of joint if

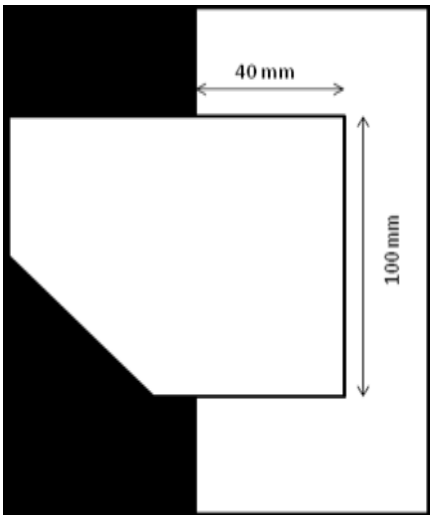
(a) Single U butt weld is used.
(b) Double V butt weld is used.

Q.9 A diagonal member of the truss is an ISA 65× 65×6 mm welded in field to a gusset plate 8 mm thick. The grade of steel used for angle is Fe 410. Design the joint to the full strength of angle.

(a) If fillet weld is provided along the length of the member.
(b) If fillet weld is provided along all sides of the angle.

Area of angle = 744 mm^2 and distance of c.g. from its heel is 18.1 mm.

Q. 10 A bracket is connected to the flange of ISHB 300 @ 588 N/m shown in fig. It carries a factored load of 180 kN. Design the welded connection.



UNIT-II

Q.1 With neat sketches explains different types of the following:

(a) Lacing system

(b) Batten system

Q.2 Write the design steps of a laced built-up column as per code?

Q.3 Write the design steps of battened built-up column as per code?

Q.4 Explain different types of the following:

(a) Buckling class

(b) Slenderness Ratio

(c) Effective length

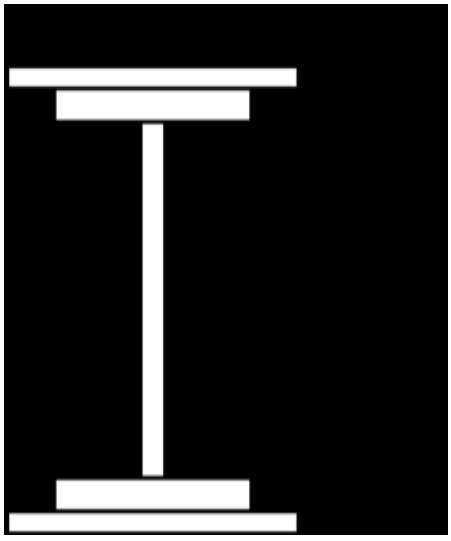
Q.5 In a truss a strut 3 m long consists of two angles ISA 100×100×6 mm. Find the factored strength of the member if the angles are connected on both sides of 12 mm gusted by

(i) One bolt

(ii) Two bolts

(iii) Welding

Q.6 Determine the load carrying of the column section ISHB 300 @ 577 N/m and a plate on both side. If it's actual length is 4.5 m. Its one end may be assumed fixed and the other end hinged. The grade of steel is Fe 410 (E 250).



Q.7 Design a rolled steel column to carry a factored load of 1650 kN. The column is 6.2 m long and adequately restrained in position and direction at both ends.

Q.8 Design a built-up column with two I-section of length 9 m long with both ends restrained in position as well as in rotation. It has to carry an axial load of 1000 kN.

Q.9 Design a lacing system if column with two channels (ISMC 300) back to back of length 8 m carry an axial factored load of 1300 kN. The column may be assumed to have restrained in position but not in direction at both ends.

Q. 10 Design a built-up column using batten system carrying a factored axial load of 1800 kN. The length of the column is 10 m. It is effectively held in position at both ends and restrained against rotation at one end. Use steel Fe 410 with $f_y = 250$ MPa.

UNIT-III

Q.1 What is the difference between laterally supported and laterally unsupported beams. Explain also the code specification for this.

Q.2 Describe the grillage foundation with neat sketch? Write the design steps for grillage foundation as per code.

Q. 3 Describe following as per code-

(a) Buckling & Crippling of web

(b) Plastic, Compact, Semi- compact and slender sections

Q.4 An ISMB 450 section is used as a beam over a span of 6 m, with simply supported ends. Determine the UDL that the beam carries if the ends are restrained against torsion but compression flange is laterally supported.

Q.5 A roof of a hall measuring 8 m× 12 m consists of 100 mm thick R.C. slab supported on steel I- beams spaced 3 m apart and the supporting wall is 300 mm. The finishing load may be taken as 1.5 kN/m^2 and live load as 1.5 kN/m^2. Design the steel beam.

Q.6 Design a simply supported beam of effective span 5m carrying a factored UDL 50 kN/m and concentrated load of 200 kN at mid span.

Q. 7 Calculate design moment M_d for laterally unsupported beam ISMB 350 @ 514 N/m. The length of span is 4 m.

Q.8 Design a simply supported beam of span 7 m which is subjected by a UDL 40 kN/m and if the ends are restrained against torsion but compression flange is laterally unsupported.

Q. 9 Design a simply supported beam of 9 m effective span carrying a load of 40 kN/m. The depth of the beam should not exceed 450 mm. The compression flange of the beam is laterally supported.

Q.10 Design a two tier grillage foundation for a column carrying 1800 kN load. The size of base plate is 800×800 mm. Safe bearing capacity of the soil is 200 kN/m^2.

UNIT-IV

Q. 1 Write short note on following –

(a) Block Shear failure

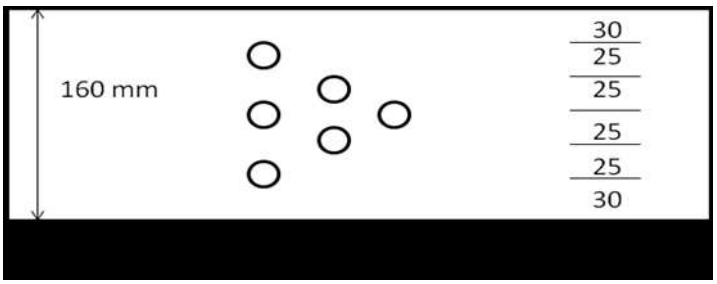
(b) Rupture failure

(c) Yielding failure

Q. 2 Explain about slab base and gusseted base with neat sketch and their advantages & disadvantages?

Q .3 Write the design steps for slab base and gusseted base?

Q.4 Determine the design tensile strength of 200 × 10 mm plate with the holes for 16 mm bolts as shown in fig. Plates are of steel, grade Fe 410.



Q. 5 Determine the tensile strength of a roof truss member 2 ISA 90×60×6 mm connected back to back to the gusseted plate of 8 mm by 4 mm weld and the effective length of weld is 200 mm on both side of angle.

Q. 6 Design a single angle section for a tension member of roof truss to carry a factored tensile load of 200 kN. The length of the member is 4 m. Use 20 mm bolts of grade 4.6 for the connection.

Q.7 Design a double angle member connected on each side of 10 mm thick gusset plate, to carry an axial load of 250 kN. Use 20 mm black bolts.

Q.8 A single unequal angle 100×75×10 mm is used as tension member connected to 12 mm gusset plate at ends with 6 nos. of 16 mm diameter bolts to transfer tension. The bolts are pitched at 50 mm. Determine the design axial tension, if

(a) The gusset plate is connected to the 100 mm leg

(b) The gusset plate is connected to the 75 mm leg

Assume edge distance of 30 mm and yield stress and ultimate stress in angle 250 N/mm^2 and 410 N/mm^2 respectively.

Q.9 Design the slab base for a built up column consisting of two channels (ISLC 350) back to back separated by a distance of 220 mm and carrying factored load of 1800 kN. Concrete grade M 10, bearing capacity of soil 350 kN/m^2.

Q.10 Design the gusseted base for a column ISHB 450, 5 m long with cover plates of 400×20 mm on both faces. The column carries factored load of 5500 kN. M10 plain concrete will be provided under the base plate.

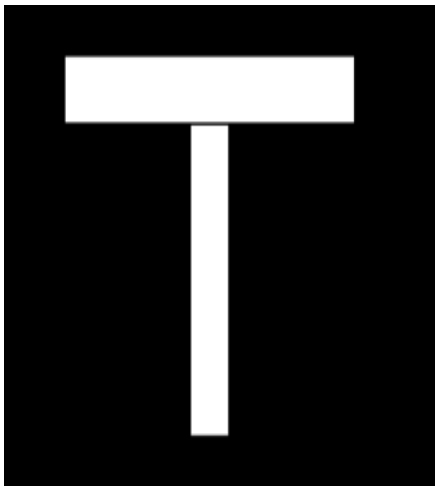
UNIT-V

Q.1 Explain about the plastic method of design and its methods?

Q.2 What is ‘Z’ and S.F. Derive the expression for both?

Q.3 Derive the expression for shape factor of triangle and circular section?

Q.4 Find out the shape factor for a given section –



Q.5 Calculate collapse load W_c for the following by static and kinematic method-

(a) Concentrate load at mid depth on SSB

(b) Concentrate load at mid depth on fixed beam

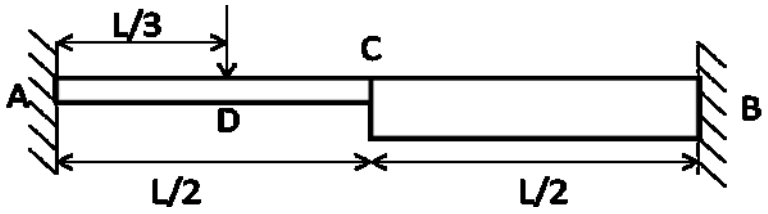
(c) Concentrate load at mid depth on propped cantilever beam.

Q.6 Find the collapse load W_c for the propped cantilever which is subjected by UDL thorough over span-

(a) Static Method

(b) Kinematic Method

Q.7 Find the W_c for the following beam-



Q.8 A continuous beam is loaded as shown in fig. Taking load factor as 1.8 calculate the value of fully plastic moment for which it may be designed as uniform section.

Q. 9 Compute the collapse load for the portal frame as shown in fig. :

Q. 10 Compute the W_c for the following case-

(a) Fixed beam of span L carries a uniformly distributed load W on the left half potion.

(b) Overhang Propped Cantilever of Uniform M_p given below-

Subject: Foundation Engineering (CE 504)

UNIT I

Q.1 What are the various loads acting on shallow foundation ? explain.

Q.2 Determine the allowable gross load and the net allowable load for a square footing of **4 m.** side and with a depth of foundation of **2.0** m. Use Terzaghi's theory and assume local shear failure. Take a factor of safety of **5.0**. The soil at the site has γ = **15** kN/m^3 , c' = **15** kN/m^2 and Φ' =**33**^{o} **.**

At Φ' = **30**^{o} N_c' = **19.0**, N_q' = **8.3,** N_γ' = **5.7**

At Φ' = **35**^{o} N_c' = **25.2**, N_q' = **12.6,** N_γ' = **10.1**

Q.3 What should be the effect of water table on bearing capacity? Please explain.

Q.4 A circular foundation is of **2.8** m. diameter. If the depth of foundation is **1** m. determine the net allowable load. Take γ **= 20** kN/m^3, c' = **30** kN/m^2, Φ' =**23**^{o} and factor of safety as **3.0**. Use Terzaghi's equation and assume general shear failure.

At Φ' = **20**^{o} N_c = **17.7**, N_q = **7.4**, N_γ = **5.0**

At Φ' = **25**^{o} N_c = **25.1**, N_q = **12.7**, N_γ = **9.7**

Q.5 Explain different types of shallow foundations with neat sketch.

Q.6 Describe any one method of determining bearing capacity of a soil in field.

Q.7 Derive the equations for bearing capacity with reference to different conditions of water table.

Q.8 Determine the allowable gross load and the net allowable load for a square footing of 2m side and with a depth of foundation of 1.0 m. Use Terzaghi's theory and assume local shear failure. Take a factor of safety of 3.0. The soil at the site has γ = 18 kN/m^3, c' = 15 kN/m^2 and Φ' = 25^o. Given N_c' = 14.8, N_q' = 5.6 and N_γ' = 3.2

Q.9 Describe Meyerhof's analysis.

Q.10 Define:-

(i) Gross ultimate bearing capacity

(ii) Net ultimate bearing capacity

(iii) Safe settlement pressure

UNIT 2

Q.1 How plate load test can be conducted? Explain in detail.

Q.2 How standard penetration test can help in finding out the bearing capacity of soil?

Q.3 Please explain skempton's method for bearing capacity.

Q.4 How can you find settlement of soil from static cone penetration test?

Q.5 Describe plate load test. What are its limitations and used ?

Q.6 Describe Skempton's analysis for bearing capacity of cohesive soils.

Q.7 How can you find out allowable bearing capacity as per Indian Standard Code Provisions IS:6403 .

UNIT 3

Q.1 What is the necessity of a pile foundation? Write down the various points.

Q.2 What are the various types of piles? Explain.

Q.3 How can be a bored pile constructed ?

Q.4 What are the various method for finding out the bearing capacity of piles?

Q.5 Indicate the circumstances under which pile foundation are used for building construction. Describe
the method of determining the capacity of a pile.

Q.6 State the different types of pile and its uses.

Q.7 Discuss different methods for the installation of piles.

Q.8 What is negative skin friction ? What is its effect on pile ?

Q.9 Explain pile load test in detail.

UNIT 4

Q.1 Describe under reamed pile foundation with neat sketches. Name the various stages involved in the construction of under reamed pile foundations.

Q.2 How do you identify an expansive soil from its index properties?

Q.3 How can you identify collapsible soil?

Q.4 How can you design foundation on collapsible soils when it is not susceptible to wetting. Write various points.

Q.5 How can you design foundation on collapsible soils when it is susceptible to wetting. Write various points.

Q.6 How can we design foundation on swelling soils. Please explain.

UNIT 5

Q.1 What are the various types of raft foundations?

Q.2 What do you understand by combined footing?

Q.3 How can we find out C.G of a rectangular combined footing? Explain.

Q.4 How can we find out bearing capacity for raft foundation?

Q.5 What are the various equations used for differential settlement of raft?

Q.6 What do you understand by 'Well fouindation'? please explain.

Q.7 Sketch out the various shapes available for well foundation?

Q.8 What are various forces acted on 'Well foundation'? Please explain.

Q.9 How would you design individual components of well foundation theoretically?

Q.10 What do you understand by 'Tilts' and 'Shifts' ? How can we resist 'Tilts' and 'Shift' of well Foundation?

Subject:Surveying-II(CE 505)

UNIT 1

Q1) What is axis signal correction and derive it.

Q2) Determine the difference in elevations of points in trigonometric leveling by angle of elevation method

Q3) Discuss reciprocal methods of levelling.

Q4) The following observations were taken

angle of elevation from P to Q =2°45'32"

height of the instrument at P=1.15m

height of the signal at Q =4.32m

horizontal distance between P and Q =9842m

If the coefficient of refraction is 0.007 and Rsin 1"=30.88m and R.L of P is 236.42m.calculate the R.L of Q.

Q5) An instrument was set up at P and the angle of elevation to a vane 4 m above the foot of the staff held at Q was 9^0 30'. The horizontal distance between P and Q was taken to be 2000 meters. Determine the R.L. of the staff station Q, given that the R.L. of the instrument axis was 2650.38.

Q6) Correct the observed altitude for the height of signal, refraction and curvature from the following data:

observed altitude =+2°48'39"

height of the instrument = 1.12 m

height of the signal = 4.87 m

horizontal distance = 5112 m

coefficient of refraction = 0.07 m

R sin 1" = 30.88m

Q7) Determine the difference in elevations of points in trigonometric leveling by angle of depression method.

Q8) explain briefly about trigonometric leveling and derive derivation for direct method.

Q9) what are the corrections we need for obtaining difference in elevation and also write the condition for the points.

Q10) Is the difference in elevation obtained by angle of elevation is similarly equal to the angle of depression. If yes then justify your answer.

UNIT 2

Q1) Discuss any five methods of setting out a simple curve.

Q2) Explain the following terms with help of diagrams

a) degree of curve

b) transition curve

c) circular curve

d) compound curve

e) reverse curve

Q3) Explain the various terms associated with circular curves with help of neat diagrams.

Q4) Describe a "Transition curve". Why it is used? Define "Shift" of a curve

Q5) Describe the simple, compound and reverse elements of circular curves.

Q6) Explain super elevation on rails and roads. Give the formula for super elevation on roads and on railways and explain each term. Give the formula.

Q7) Explain the degrees of curves. Explain the method of setting out of circular curve

Q8) Explain the following and indicate in diagram, parts, a circular curve

(i) Back Tangent (ii) Forward Tangent

(iii) Point of intersection (iv) Point of Curve

(v) Point of Tangency (vi) Inter section angle

Q9)) Determine the offsets to be set out at 1/2 chains interval along the tangents to locate a 16 - chain curve, the length of each chain being 20m.

Q10) Define types of curves.

UNIT 3

Q1) Explain the following 1) Triangulation

2) Grades of triangulation

3) Strength of figure

4) Satellite station

Q2) Explain the field procedure of triangulation

Q3) Equipment needed for baseline measurement and indivisibility of stations.

Q4) Briefly explain merits and de merits of traversing and also explain strength of the figure.

Q5) Write difference between traversing and trilateration. Explain base line

Q6) Describe method of calculation of height of the tower

Q7) Discuss the importance of base-line measurements. Describe some common equipment used for baseline measurements

Q8) Discuss the corrections that may be needed for base line measurements.

Q9) Explain the method of triangulation. Explain the terms

(i) Grades of triangulation

(ii) strength of figure

(iii) Selection of triangulation stations.

(iv)Satellite stations.

Q10) What are the principal objects to be kept in view in selecting the ground for a base line in large survey?

UNIT 4

Q1) State the different kinds of errors of measurement in surveying.

Q2) Explain the procedure for adjustment of a Quadrilateral

Q3) Explain the different cases for determination of the most probable values

Q4) Methods of adjustment of triangulations figures

Q5) What are braced quadrilaterals? Explain their use in adjustment of triangulation figures in surveying

Q6) Write the notes on following.

(i) Probability curve and its equation

(ii) Principle of least squares.

Q7) Explain:

(i) Most probable value (ii) Standard error

Q8) Describe the sources of errors in surveying and how they can be minimized.

Q9) Describe the probability curve and its properties related to error analysis

Q10) Briefly explain adjustments of levels.

UNIT5

Q1) What is astronomical triangle and write about Napiers rule and all 10 equation for it.

Q2) Explain briefly electronic distance measurement .

Q3) Write short notes on

(i) The celestial sphere

(ii) The celestial Horizon

Q4) Write short notes on

(i)Zenith

(ii) Nadir

Q5) Write short notes on

(i) Astronomical triangle

(ii) The latitude

Q6) Write short notes on

(i) Napier's rule

(ii) The longitude

Q7) Establish relationship between different coordinate systems

Q8) What are methods of determination of Azimuth in surveying?

Q9) Write short notes on

(i)The sensible Horizon (ii) The zenith and Nadir

(iii) The longitude (iv) The latitude.

Q10) Explain use of total station

Subject: Theory Of Structure (CE506)

UNIT-1

Q.1 Explain the indeterminacy in the structural. Differentiate between static and kinematic indeterminacy.

Q.2 Explain Maxwell Reciprocal Theorem.

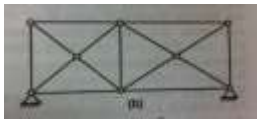
Q.3 A beam of length 6 meter is simply supported at its ends and carries two point load of 48 KN and 40 KN at distance of 1 m and 3 m. Respectively from the left support.

Calculate by moment area method :

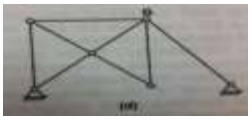
- Deflection under each load
- Maximum deflection,
- The point at which maximum deflection occurs.

Take E = 2 x 10^5 N/mm^2 and I = 85 x 10^6 mm^4

Q.4 Explain the indeterminacy in the structural. Find the degree of internal, external and totel indeterminateness of the frames shown in fig.



Q.5 Explain the indeterminacy in the structural. Find the degree of internal, external and totel indeterminateness of the frames shown in fig.



Q.6 Explain the indeterminacy in the structural. Find the degree of internal, external and totel indeterminateness of the frames shown in fig.

Q.7 Explain the indeterminacy in the structural. Find the degree of internal, external and totel indeterminateness of the frames shown in fig.

Q.8 A fixed beam, 12 m span, carries two point loads of 50 KN, 4 m and 8 m from one end. Using moment area method, obtain support moment and central moment and calculate deflection at centre. $I = 8 \times 10^6$ mm^4 and $E = 2 \times 10^5$ N/mm^2.

Q.9 Find the slope and deflection at a mid span for a fixed beam loaded by point load at the center of the span.

Q. 10 A built-in beam, 6 m span, carries a point load of 100 KN of 1.5 m from right-hand support. Find the position and amount of maximum deflection.

$I = 7.3 \times 10^7$ mm^4 $E = 2 \times 10^5$ N/mm^2.

UNIT – 2

Q.1 Using slope deflection method, analysis a beam as shown in fig. The ends A and C are fixed supported. Assume EI is constant.

FIG.

Q.2 Using Moment Distribution method, analysis a portal frame as shown in fig. The ends A and D are simply supported. Assume EI is constant.

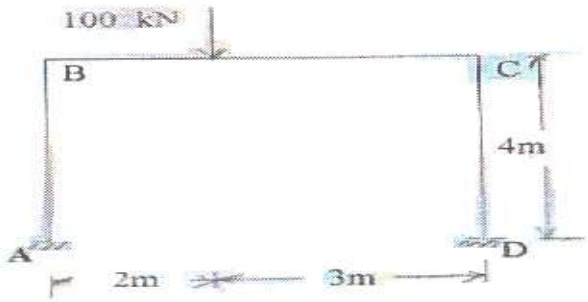
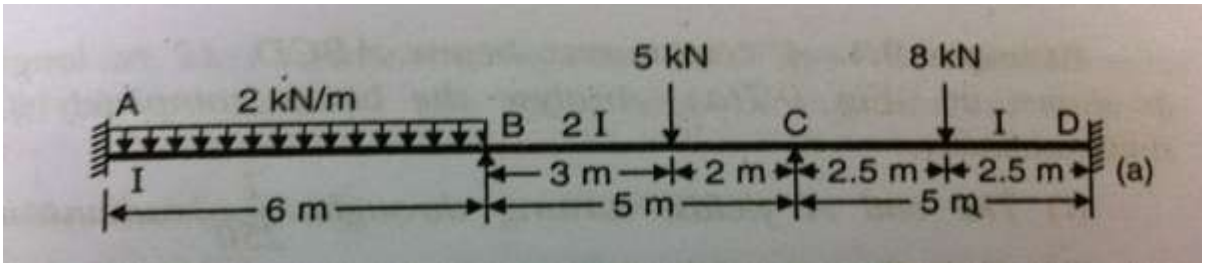
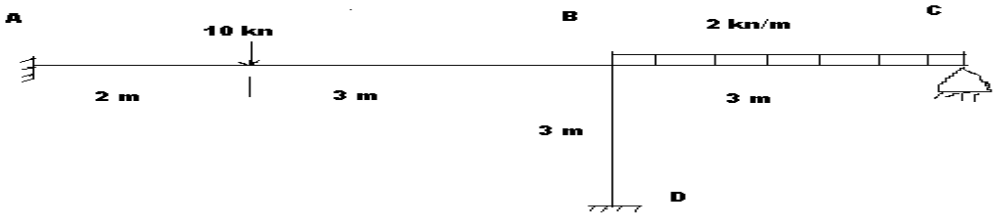


Figure 6

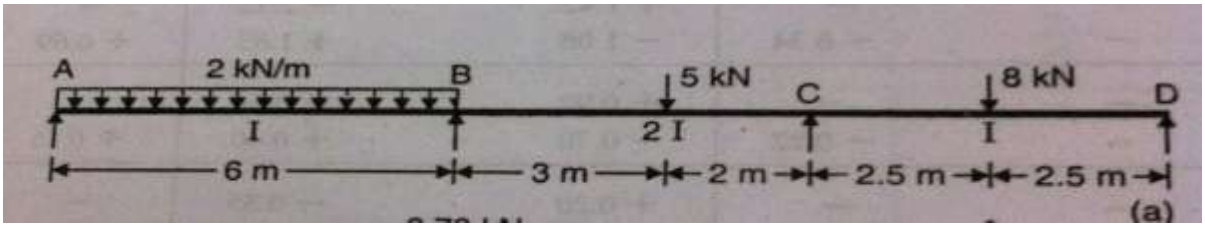
Q.3 Using slope deflection method, analysis a beam as shown in fig. The ends A and D are fixed supported. Assume EI is constant. Determine the bending moments at the supports and plot the bending moment diagram.



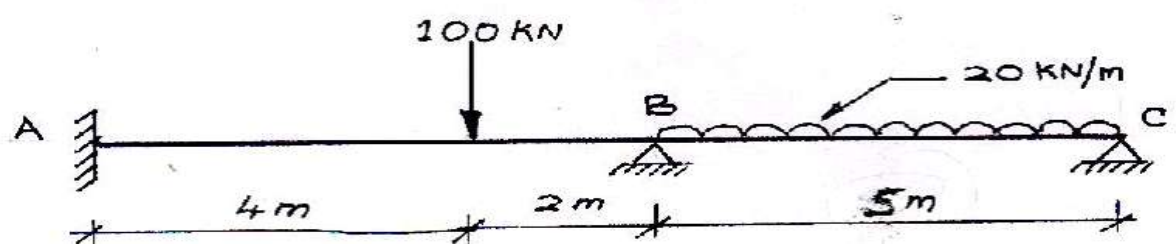
Q.4 A continuous beam ABC is supported on an elastic column BD and is loaded as shown in the fig. Treating joint B as rigid, analyze the frame and plot the bending moment diagram.



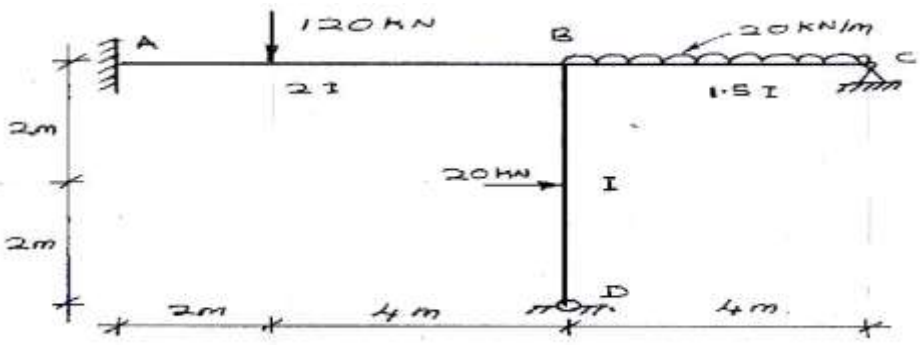
Q.5 Using Moment Distribution method, analysis a portal frame as shown in fig. The ends A and D are simply supported. Assume EI is constant.



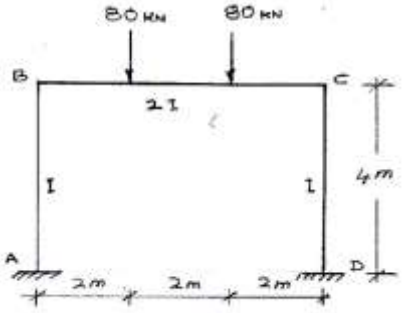
Q.6 Analyze two span continuous beam ABC by slope deflection method. Then draw Bending moment & Shear force diagram. Take EI constant



Q.7 Analyze the simple frame by slope deflection method (shown in figure). End A is fixed and ends B & C are hinged. Draw the bending moment diagram.



Q.8 Analyze the portal frame by moment-distribution method (shown in figure) and also drawn bending moment and shear force diagram.



Q. 9) Explain the procedure of moment distrbution method. With steps.

Q. 10) Explain the procedure of slope deflection method. With steps.

UNIT-3

Q.1) A beam AB of span L is fixed at both ends and carries a uniformly distributed load w per unit length. Using the column analogy method, compute the fixed end moments.

Q.2) A beam AB of span L is fixed at A and B, and carries a point load W at a distance a from A and b from B. Calculate the support moments.

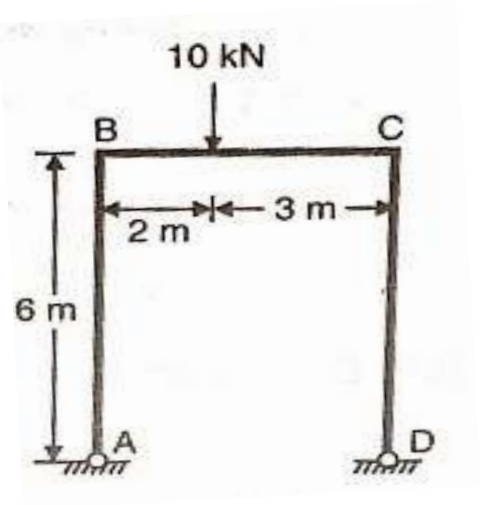
Q. 3) A beam AB of span L is fixed at both the ends and carries a point load W at its centre. The moment of inertia of first half portion of the beam is 2I and that of the next half is I. Compute the fixed end moment.

Q. 4) A portal frame ABCD is fixed at A and D and has stiff joint B and C. It carries a uniformly distributed load w per unit length on BC. Plot the bending moment diagram. EI is constant for the whole of the frame.

Q. 5) A beam AB of span 3 m is fixed at both the ends and carries a point load of 10 kN at C, distant 1 m from A. The moment of inertia of the portion AC of the beam is 2I and that of portion CB is I. Calculate the fixed end moment.

Q. 6) A beam of 20 m span is fixed at fixed at both the ends. A couple of 12 kN-m is applied to the beam at a distance 8 m from the left hand support, about a horizontal axis at right angles to the beam. Plot the B.M. diagrams.

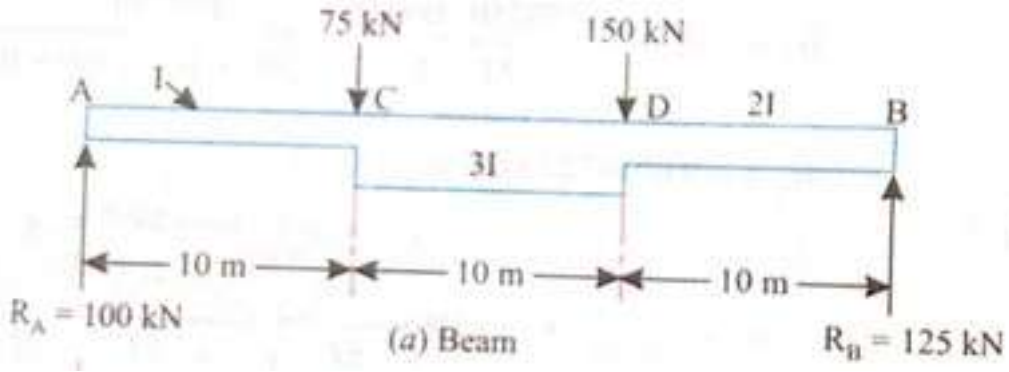
Q. 7) A portal frame ABCD is hinged at A and D, and has stiff joints at B and C. Draw the bending moment diagram due to a point load of 10 kN as shown in fig.



Q. 8) Define Conjugate beam method.

Q.9) A simply supported beam is carrying a load W at the centre. Calculate slopes at its ends and the central deflection, using conjugate beam method.

Q. 10) Using cojugate beam method, for the beam (shown in fig.). find the slopes and deflections at A, B, C, and D. Given: $E = 200 \times 10^6$ kN/m^2 and $I = 300 \times 10^{-4}$ m^4.



UNIT – 4

Q. 1) Explain the strain energy and method of strain energy.

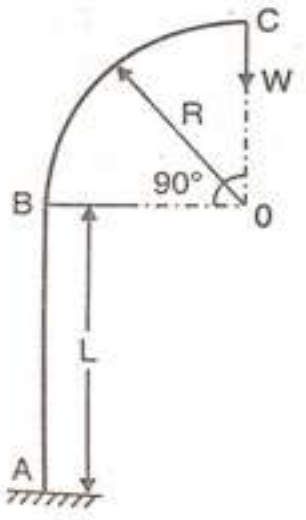
Q.2) Define the castigliano's first theorem.

Q. 3) Calculate the central deflection, and the slope at ends of a simply supported beam carrying a U.D.L. w per unit length over the whole span.

Q. 4) A freely supported beam of span L carries a central load W. The sectional area of the beam is so designed that the moment of inertia of the section increases uniformly from I at ends to 1.5I at the middle. Calculate the central deflection.

Q. 5) Using Castigliano's first theorem, determine the deflection and rotation of the overhanging end A of the beam loaded as shown in fig.

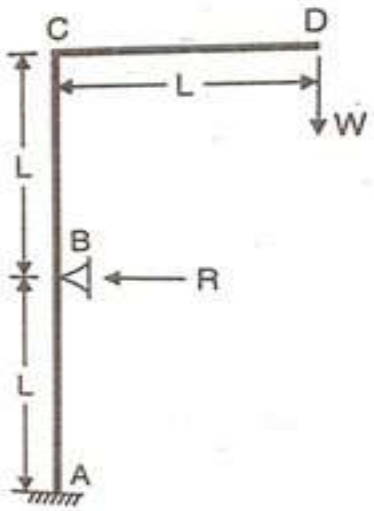
Q. 6) A steel bar bent to the shape (shown in fig.) is fixed at A and carries a vertical load W at C. Calculate the vertical deflection of C. EI is constant throughout.



Q.7) Define the castigliano's second theorem.

Q. 8) A continuous beam of two equal span L is uniformly loaded over its entire length. Find the magnitude R of the middle reaction by using the Castigliano's theorem.

Q. 9) A uniformly continous bar ABCD is built in at A and laterally supported at B (shown in fig.). Find the reactive force R at B due to the action of a vertical load W at D as shown. Neglect the effect of direct compression in the vertical portion of the bar. Joint C is stiff. Sketch the BMD for the frame.



Q. 10) A beam AB of span 3 m is fixed at both the ends and carries a point load of 9 kN at C distant 1 m from A. The moment of inertia of the portion AC of the beam is 2I and that of portion CB is I. Calculate the fixed end moments and reactions.

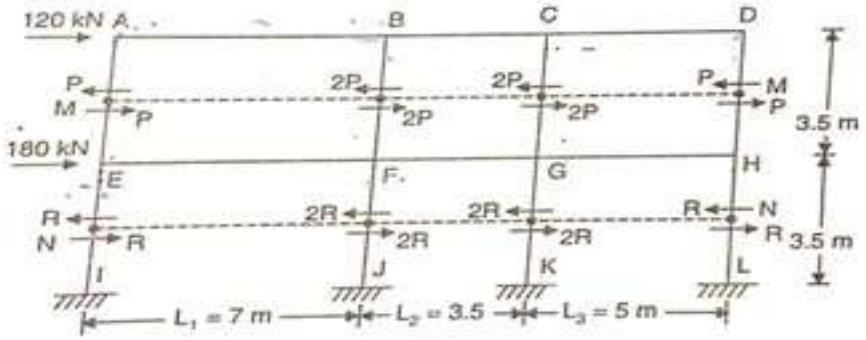
UNIT-5

Q. 1) What do you mean by a building frame? Discuss in brief the method of analysis.

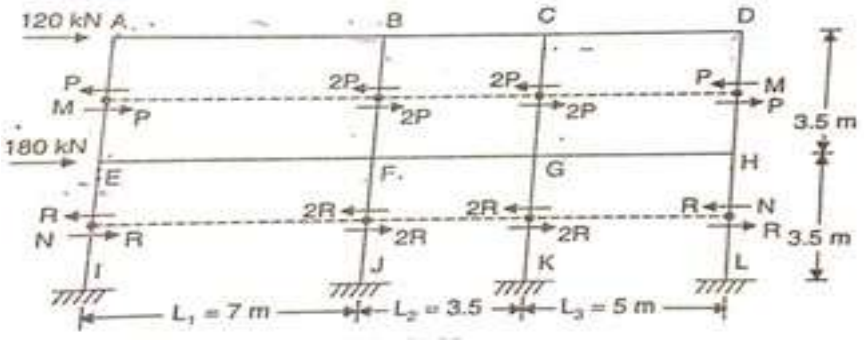
Q. 2) Explain the portal method for analysing a building frame subjected to horizontal forces.

Q. 3) Explain the cantilever method for analysing a building frame subjected to horizontal forces.

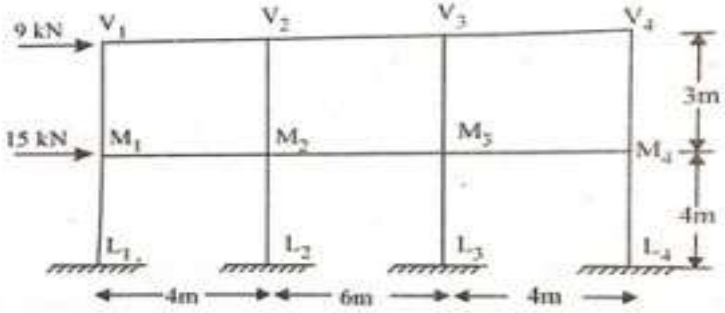
Q. 4) Analysis the building frame, subjected to horizontal forces, (shown in fig.). Use portal method.



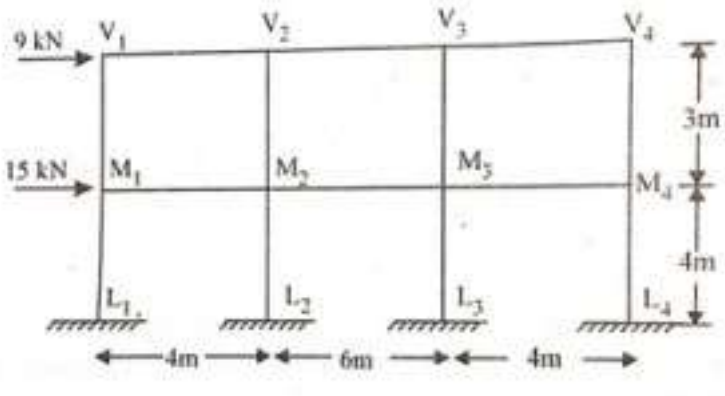
Q. 5) Analysis the building frame, subjected to horizontal forces, (shown in fig.). Use cantilever method.



Q. 6) Analysis the building frame, subjected to horizontal forces, (shown in fig.). Use portal method.

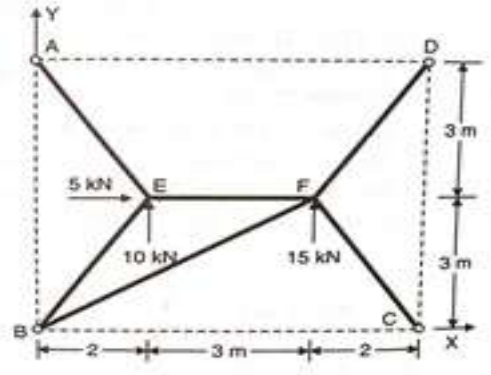


Q. 7) Analysis the building frame, subjected to horizontal forces, (shown in fig.). Use cantilever method.

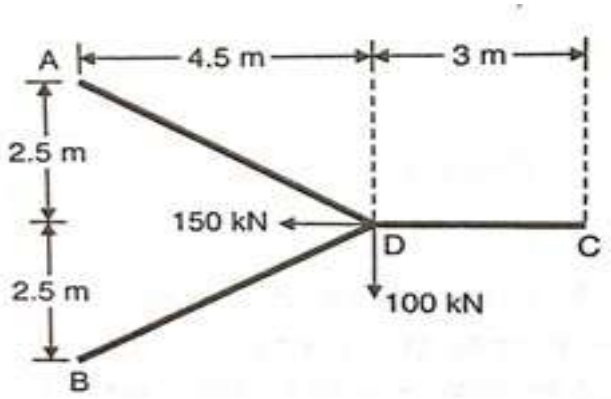


Q. 8) Define the space frame, And Discuss in brief the method of analysis.

Q. 9) A space frame shown in figure is supported at A, B, C and D in horizontal plane, through ball joints. The member EF is horizontal, and is at a height of 3 m above the base. The loads at the joints E and F, shown in figure act in a horizontal plane. Find the forces in all the members of the frame.



Q. 10) Figure shows the plan of a tripod, the feet A, B and C being in the same horizontal plane and the apex D being 3.75 m above the plane. Horizontal loads of 100 kN and 150 kN are appiled at D in the directions shown. Find the forces in the members assuming that all joints are pin-joints.



Subject: TRANSPORTATION ENGINEERING II (CE601)

UNIT I

Q.1 Draw the typical cross sections of single line B.G straight track in cutting and in embankment.
Q.2 Write short note on factors in gauge selection of a new track.
Q.3 Describe the requirements for an ideal permanent way.
Q.4 Enumerate various rail gauges used in different parts of the world? Why it is desirable to have a uniform
gauge for the whole railway network of country?

Q.5 what are the requirements of an ideal sleepers? Compare the merits and demerits of different type of
sleepers.
Q.6 Describe the different types of rail joints used on railway tracks. Elaborate the advantages and
limitations of the welded rail joints.
Q.7 Draw a typical cross-section of permanent way. Discuss in brief the basic function of various components of a railway track.
Q.8 Discuss different types of rail section used on B.G and M.G in India. Mention the relative merits and
demerits of any two of them.
Q.9 Using a sleeper density of m+5, find out the number of sleeper required for constructing a railway track\
640 meters long(B.G track).
Q.10 What are the functions of ballast in railway track? Also discuss the requirement of good qualities of the
ballast.

UNIT 2

Q.1 Draw neat sketches of the following:
(i) Diamond Crossing
(ii) Scissors Crossing
Q.2 Draw a neat diagram of simple right hand turnout and show its various components parts.
Q.3 Calculate all the elements required to set out a 1 in 12 turnout taking of from a straight B.G track with
its curve starting from the toe of the switch and passage through Theoretical Nose Crossing(T.N.C).
Take heel divergence d= 11.4 cm. Use right angle method.
Q.4 What do you understand by a crossing ? Explain different types of crossing used in railway track.
Q.5 What are the functions of points and crossing on the railway track? Draw a neat diagram of a right hand
turnout and label points and crossing over it.
Q.6 Explain turnouts and its types.
Q.7 What do you understa;nd by points or switches?
Q.8 Explain the following :
(a) T.N.C and A.N.C
(b) Number of crossing and angle of crossing
Q.9 Explain in brief about design calculations of turnouts.
Q.10 Calculate the elements of a turnout, when it is given G = 1.676 m, N = 12, d = 13.3 cm and angle of
switch, i.e $\beta = 1°8'0''$.

UNIT 3

Q.1 Describe the factors influencing the selection of site of a railway station.
Q.2 A 5 degree diverges from a 3 degree main curve in reverse direction in the layout of a B.G track yard. If
the speed on the branch line is restricted to 40 kmph, determine the restricted speed on the main line.
Q.3 Calculate super elevation and maximum permissible speed for a 3° horizontal curve on broad gauge
track having maximum sanctioned speed 120 kmph. Assume equilibrium speed as 90 kmph and booked
speed of goods trains as 60 kmph.
Q.4 Discuss various types of gradients giving their permissible value adopted in Indian railways.
Q.5 What are the objectives of providing transition curves on railways? What should be the requirements of
an ideal transition curve?
Q.6 What is the necessity of grade compensation at curves? What should be the compensated gradient
provided when a 4° horizontal curve is to be introduced on a section of B.G track for which the rulling
gradient has been fixed as 1 in 200.
Q.7 What do you understand by 'Negative Superelevation'? When from a layout of B.G yard, a 8° curve
branches off from a 4° main curve in an opposite direction. If speed is restricted to 28.95 kmph and
permissible value of cant deficiency is 7.6 km. Determine the speed restriction on the main line.
Q.8 Explain the necessity of widening of gauge on curves. If the wheel base of a moving vehicle is 4.12m,
the degree of curve is 5° and flanges project 3.2 cm below the top of rail, determine extra width required
on curve.
Q.9 What do you understand by cant deficiency?
Q.10 Explain negative super elevation.

UNIT 4

Q.1 Explain different patterns of runway configurations.
Q.2 Write short notes on 'Zoning Law' and draw the dimensional sketch of imaginary surfaces for
International Airport.
Q.3 Find out the actual runway length for the runway of basic length 1000 m, situated at an altitude of 500
m above MSL and having an effective gradient of 0.5 %. Given the airport reference temperature at
30°C.
Q.4 Explain the following terms:
(i) Wind rose diagram (ii) Exit Taxiway

(iii) Imaginary Surface (iv) Holding Apron

Q.5 Enumerate the various factors which will help in selecting a suitable site for an airport.

Q.6 What is basic runway length? What corrections are applied to it to determine the actual runway length?

Q.7 The length of runway under standard condition is 1620 m. The airport site has an elevation of 270 m. If reference temperature is 32.94°C. If the runway is to be constructed with an effective gradient 0.2 %, determine the corrected runway length.

Q.8 How improvement of existing airports can be done?

Q.9 Explain in brief about airport classification.

Q,10 Explain typical airport layouts ans also layout of military airports.

UNIT 5

Q.1 Explain CBR method of design of flexible pavement. What are the limitations of this method?

Q.2 Describe Load Classification Number(LCN) Method of Rigid pavement design for Runway.

Q.3 What are the various factors to be considered in airport pavement design? Discuss the significance of each.

Q.4 Describe in detail the Portland Cement Association method of rigid pavement design for airports.

Q.5 Explain the Westerguard's concept of stresses in rigid pavements. What are the limitations of this concept?

NOTE:- As the content of Unit V are in very less number, So only 5 questions are possible.

Subject: Concrete Structures- I (CE602)

UNIT-I

Q. 1 (a) Discuss the major features of working stress method and limit state method.

(b) What do you understand by a balanced section, over reinforced and under reinforced section?

(c) A rectangular singly R.C. beam with cross-section 300mm X 600mm is simply supported over the clear span of 4.25m with support of 300mm each. Calculate ultimate moment of resistance of the beam. Use M 20 and Fe 415 steel grade.

Q.2 (a) What do you understand by a singly reinforced beam and doubly reinforced beam. State the condition where a doubly reinforced beam is preferred.

(b) Determine the ultimate moment of resistance capacity of a doubly reinforced beam as 300mm and effective depth 600mm and cover as 40mm both in tension and compression. Reinforcement in compression as 2 nos @ 25mm ø and intention as 5 nos @ 25 mm ø. Use M 20 concrete Fe 415 steel grade.

Q.3 (a) Draw the strain and stress block parameters for a under-reinforced doubly reinforced E rectangular beam section and write the formula to calculate the moment of resistance of the same. Also describe each and every term used in the formula.

(b) Determine the ultimate moment of resistance of the following :-

T-beam section, having M 20 concrete and FE 415 steel.

Flange width = 1200mm
Flange depth = 90mm
Overall depth of T-beam = 650mm
Web width = 240mm
Area of tension steel (provided at an effective cover of 50 mm) = 200 mm^2.

Draw the neat sectioned sketch showing strain and stress block parameter and neutral axis depth.

Q.4 (a) Describe the salient features of "Working Stress Design Philosophy" and "Limit state Design Philosophy".

(b) Determine the area of tension reinforcement required for a singly reinforced beam section of size 300 X 600 mm (overall) to carry a factored moment of 175kN-m. Use M 20 and Fe 415. Also show the detailing of reinforcement in cross-section of beam.

Q.5 (a) (i) Find the M.R. of a singly reinforced concrete beam of 200 mm width and 400 mm effective depth, reinforced with 4 bars of 16 mm diameter of Fe 415 steel. Take M20 concrete.

(ii) Determine the actual stresses when the section is subjected to the limiting moment of resistance.

(b) A singly reinforced rectangular beam of width 230mm is subjected to a B.M. of 40k N/m at working loads. Using L.S.M. find the overall depth of the beam and area of reinforcement. Take M15 grade concrete and mild steel of grade Fe 250 check the section for minimum and maximum area of tensile steel.

Q.6 (a) A beam, simply supported over an effective span of 7 m carries a live load of 20 kN/m. Design the beam, using M 20 concrete and HYSD bars of grade Fe 415. Keep the width eual to half the effective depth. Assume unit weight of concrete as 25 kN/m³.

(b) Enumerate the lever arm formulae for singly reinforced section.

Q.7 Explain the terms:

(i) Characteristic Load
(ii) Design Load.
(iii) Partial safety factor for Loads

Q.8 A rectangular reinforced concrete beam of width 400 mm and effective depth 600 mm is to be designed to support an ultimate moment of 600 kNm using M20 grade concrete and Fe 415 HYSD bars, design suitable reinforcement in the beam at an effective cover of 60 mm.

Q.9 Design the reinforcements for a doubly reinforced concrete beam section to support a factored moment of 1000kNm. Assume b = 400mm, d=550mm, cover d' = 50 mm ; $f$ck= 30 N/mm² and fy = 415N/mm².

Q.10 Determine the area of tension reinforcement required for a singly reinforced R.C. beam section having b = 300 mm and d = 450 mm to resist an ultimate moment of 130 kNm. Use M 20 and Fe 415. Give the final sketch showing all details.

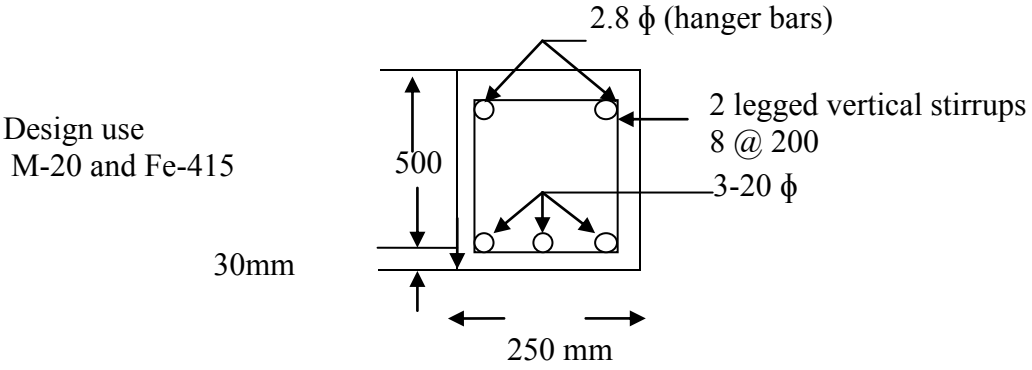
UNIT- 2

Q.1 Design a singly reinforced concrete beam supported on two walls of thickness 500mm spaced at a clear distance of 6m. The beam carries a super imposed load of 10 kN/m. Use M 20 concrete and Fe 415. Apply all checks.

Q.2 Design a doubly reinforced beam which rests over a clear span of 5m. The superimposed dead load is 18kN/m and live load is 12kN/m. Bearing at each end is 50mm. The beam has cross-section of 300 x 550mm. Use M15 and Fe 415 grade. Apply all the checks.

Q.3 Design a doubly reinforced beam to carry a super imposed load of 60 Kn per meter run. The overall depth and width of the beam are restricted to 840 mm and 300 mm respectively. The beam has a clear span of 5m and a bearing of 50 cm on each end. Take c = σcbc = 5 N/mm² ; t = σst = σsv = 140N/mm² and m = 18.

Q.4 (a) Determine the " Ultimate shear strength" of the support section shown in Fig. by using limit state method.



Design use
M-20 and Fe-415

(b) A simply supported beam spanning over 8m effective span is of rectangular section 300 x 600mm overall. The beam is reinforced with 4 bars of 25mm diameter on tension side at an effective cover of 50mm. Two nominal hanger bars of 12 mm diameter are provided on the compression side. The beam is subjected to a service moment of 140 kN.m at the centre of span section. Use M-20 and Fe-415 and check the beam for the serviceability of deflection using theoretical method as per IS 456 : 2000.

Q.5 (a) A rectangular beam with width of section = 350 mm and effective depth = 550mm has a factored shear of 400 kN at the critical section near support. The beam is reinforced with 4-32 ϕ (Fe-415) which are continued to support. Use M-25 grade of concrete. Design the shear reinforcement at support using ™-legged vertical stirrups of 10mm diameter (Fe-415).

(b) A hall of 4m x 9m is to be converted with a R.C.C. roof slab of 180mm thick. Design the slab using :

M-25 grade of concrete. Fe-415 grade of steel service live load 4kN/m², Dead load (including self weight of slab) = 5.5 kN/m. Assume effective span of slab as 4.16m.

Design the slab and show the reinforcement detail in plan and section.

Q.6 (a) Design an R.C. slab for a room having inside dimension 3m x 7m. The thickness of supporting wall is 300 mm. The slab carries 75 mm thick line concrete at its top, the unit weight of which may be taken as 20 kN/m³. The live load on the slab may be taken as ™ kN/m². Assume the slab to be simply supported at the ends. Use M20 concrete and Fe 415 steel.

(b) A simply supported beam of rectangular section spanning over 6 m has a width of 300 mm and overall depth of 600 mm the beam is reinforced with 4 bars of 25mm diameter on the tension side at an effective depth of 550 mm spaced at 50 mm centers. The beam is subject to a working load moment of 160 kN/m at the centre of span section. Using M-25 grade concrete and Fe-415 HYSD bars, check the beam for the serviceability limit state of cracking according to IS: 456-2000 code method.

Q.7 (a) Design the shear reinforcement for a beam width b= 350mm, d = 550mm, Vu = 125 kN, $f$ck = 25 N/mm², fy = 415 N/mm² and percentage of steel is 1.67 %.

(b) Design a cantilever slab having an overhang of 1.25 m. Take live load intensity of 1000 N/m² on the cantilever. Use M 20 concrete and HYSD bars. Assume weight of finishing at the top of slab as 800 N/m².

Q.8 Design a simply reinforced beam to carry a live load of 20000 N/m. The beam is 300 mm wide with a clear span of 4.50m. The bearing at each end is 300mm. Use M-20 concrete and Fe 250 steel.

Q.9 Design a simply supported one way R.C. slab for an effective span of 3m. Assume following data :

Effective depth of slab = 120 mm.
Total ultimate load (inclusive of self weight) = 4 kN/m².
Use M- 20 and Fe-415.
Give the neat sectioned sketch along short span showing all details.
Also check the slab for deflection.

Q.10 Design a slab over a room of 4m x 6 m as per IS code. The edges of the slab are simply supported and the corners are not held down. The live load on the slab is ²,000 N/m². The slab has a bearing of 150 mm on the supporting walls, use M-20 concrete and Fe 415 steel.

UNIT-3

Q.1 Design a simply supported R.C. slab for a room having inside dimensions as 3m x 8m. The slab carries a lime concrete of 75 mm thickness at its top. The live load on the slab is 2 kN/m². Take unit weight of lime concrete as 20 kN/m³. use M 20 grade of concrete and steel of Fe 415 grade.

Q.2 Design a R.C. slab for a room measuring 5m x 6m from inside. The slab carries a live load of 2kN/m² and 25mm thick lime concrete having unit weight as 20 kN/m³. the slab is simply supported at the supported at the four edges, with corners free to lift. Take the width of supported wall as 350 mm.

Q.3 Design a two-way slab (200 mm thick) which is simply supported on all the four walls of a hall with effective span of 6.3m and 4.5m.
Assume service live load : = 10kN/m² and
dead load (including self weight) = 5kN/m².
use M- 25 grade of concrete and fe-415 grade of steel.
(i) Determine, provide and show the reinforcement along short and long span.
(ii) Check the slab for deflection using empirical method (IS : 456 : 2000)

Q.4 The interior panel of a flat slab is of 6m x 6m. The thickness of slab = 150mm, thickness of drop = 200 mm column head diameter = 1.5 m, drop width = 3m. The slab is subjected to total ultimate bending moment (M0) = 230 kN/m. Distribute the moments in column and middle strips and show them in neat plan.

Q.5 Design an interior panel of a flat slab with panel size 6x6m supported by columns of size 500x 500mm. Provide suitable drop. Take live load as 4kN/m². Use M 20 concrete and Fe 415 steel.

Q.6 A flat slab floor system consisting of seven panels in each direction supports live and finish loads of 0.4 kN/m² and 1.25 kN/m², respectively. The supporting columns are of 550 mm diameter with storey height of ².0 m. Usingthe provisions of IS : 456 for the direct design method, design an interior panel of size 7.5 x 6.0m appropriate column heads and drops. The materials used are M 20 concrete an HYSD steel of grade FE 415.

Q.7 Design the interior panel of a flat slab for a warehouse to suit the following data, size of warehouise 247 m x 24 m divided into panels of 6mx6m

Loading class - 5 kN/m²
Materials : M – 20 grade concrete.
Fe- 415 grade HYSD bars.
Show detailing of reinforcement properly by drawing figures.

Q.8 Design a two way slab for an office floor to suit the following data : **Size of office** = 4m x 6m

Edge condition = Two adjacent edges discontinuous. **Materials** : M-20 grade conxrete and Fe 415 HYSD bars. Show detailing of reinforcement by drawing appropriate figures.

Q.9 Design an interior panel of a flat slab for a flat slab for a live load of 4000 N/m². The slab is provided with a floor finish weighing 1000N/m². The panels are 6m x 6m. Drops shall be provided, use M- 20 concrete and Fe 415 steel.

Q.10 Write the design steps of two way slabs?

UNIT-4

Q.1 Design a circular column to carry an axial load of 1000 kN. Use M 20 and Fe 415 grade of steal. Also provide helical reinforcement for the above column.

Q.2 (a) A concrete column of 450 mm x 450mm is reinforcened with 4 bars of 20mm dia. Determine the ultimate load capacity of column using M20 concrete and steel Fe 415 grade.

(b) Give typical sketch of the following :

(i) Isolated Square footing.
(ii) Strap footing.
(iii) Raft foundation.

Q.3 (a) Write a short note on Pu – Mu interaction curve and their use in designing the column.

(b) Determine and provide the longituadingal reinforcement and lateral ties in a column of size 550 x 420 mm. Also check the column for minimum eccentricity if the unsupported length of column is ² m. Use M 20 and Fe 415. The column is subjected to ultimate axial load of 2500 kN.

Q.4 (a) A reinforced concrete short column of 480 mm diameter is reinforced with 6-20 ϕ (Fe- 415) and 8 mm helix with 75mm pitch. Compute the maximum load carrying of the column if concrete is of M- 25 grade.

(b) Descibe the " balanced failure", " compression failure" and " tension failure" of a short column subjected to axial load and uniaxial moment.

Q.5 Determine the maximum factored load carrying capacity of a square column 400 mm x 400 mm, reinforced with 8 bars or 25 mm dia, uniformly spaced along all the four sides with an effective cover of 60 mm. The column is braced against sideway and has unsupported length of 5.5 m and and effective length factor of 1 about both the axes. Assume M20 concrete and Fe 415 steel.

Q.6 Design the reinforcements in a circular column of diameter 300mm to support a service axial load of 800 kN. The column has an unsupported length of 3m and is braced against side away. The column is reinforced with helical ties. Adopt M- 20 grade concrete and Fe – 415 HYSD bars.

Q.7 Design the reinforcements in rectangular column of size 300mm by 500mm to support a design ultimate load of 500kN. Together with a factored ultimate load of 500kN. Toghetr with a factored moment of 200kM.m. Adopt the value of $f$ck = 20N/mm² and fy = 415N/mm².

Q.8 Design the reinforcements in a column of size 400 mm x 600 mm subjected to an axial working load of 2000kN. The column has an unsupported length of 3m and is braced against side away in both directions. Adopt M- 20 grade concerte and Fe-415 HYSD bars, draw appropriate figures.

Q.9 Design the reinforcements in a circular column of diameter 300 mm with helical reinforcement to support a factored load of 1500 kN. The column has an unsupported length of 3m and is braced against sideway. Adopt M- 25 grade concrete and Fe 415 HYSD bars. Draw figures.

Q.10 Differentiate between : (i) Short and long column. (ii) Unsupported and effective length of column.

UNIT-5

Q.1 A footing supports a square column of size 400mm x 400mm with a service load of 900 kN. Find out the size of footing, depth of the footing and reinforcement required in it, if the safe bearing capacity of soil is 200kN/m². Use M- 20 and Fe- 415. Also draw Neat Sketch.

Q.2 Describe one way shear and two way shear in a square footing.

Q.3 Describe " one way shear" and " punching shear" in isolated footing and critical sections for these cases.

Q.4 Design an isolated footing for a square column, 400 mm X 400 mm with 12-20 ϕ (Fe-415) longitudinal bars, carrying service axial load of 1500 kN. The safe bearing capacity of soil is 250kN/m² at a depth of1 m below the ground level. Use M- 20 and Fe- 415. Draw the neat sectional elevation and plan showing reinforcement detailing.

Q.5 Two columns having cross-section of 250 x 250 mm and 300 x 300 mm are loaded with 300 kN and 500 kN service loads respectively. The centre to centre distance between the column is 4m and the safe bearing capacity of soil is 100 kN/m². Design the combined rectangular footing if the width of footing is restricted to 1.5m. Use M- 20 and Fe- 415.

Q.6 Design a combined footing connecting two columns A and B 4m centre to centre carrying an ultimate axial load of 1000kN and 400kN respectively. The boundary line of the property is 400 mm from the outer face of column. A column is 360 mm x 360 mm and column B is 420 mm x 420 mm. The bearing capacity of the soil obtained from plate load teat is 106kN/m². Use M 20 mix and Fe 415 grade steel. Assume effective cover equal to 60m.

Q.7 Design a reinforced concrete footing for a rectangular column of section 300 mm by 500 mm supporting an axial factored load of 1500 kN. The safe bearing capacity of the soil at site is 185 kN/m². Adopt M- 20 grade concrete and Fe -415 HYSD bars.

Q.8 A reinforced concrete column 400 mm x 400mm supports an axial service load of 1000 kN. The safe bearing capacity of the soil at site is 200 kN/m². Adopting M- 20 grade concrete and Fe- 415 HYSD bars design a suitable footing for the column and sketch the details of reinforcements.

Q.9 Design a combined column footing with a strap beam for two reinforced concrete columns of size 400 mm x 400 mm spaced at 4m c/c and each supporting a service axial load of 1000 kN. The safe bearing capacity of soil at site is 150 kN/m². Adopt M- 20 grade concrete and Fe- 415 HYSD bars. Draw appropriate figures.

Q.10 A rectangular column of size 350 x 600 mm is loaded with 800 kN load. Determine the dimensions of the rectangular footing so as to give same bending moment per meter along X and Y directions. Give the neat dimensional plan of footing and column. Assume safe bearing capacity of soil = 200 kN/m².

Subject: Design of Steel Structure -II (CE603)

UNIT-I

Q. 1 What is Gantry girder? Where it is used? Explain its various components with sketches.

Q.2 Explain about imported loads in brief? Formulate the maximum B.M. and S.F. for gantry girder with sketch.

Q.3 Write the design steps for gantry girder as per code?

Q. 4 Design a simply supported gantry girder to carry one electric overhead travelling crane, given:

Span of gantry girder = 6.5 m
Span of crane girder = 16 m
Crane capacity = 250 kN
Self weight of crane girder excluding trolley =280 kN
Self weight of trolley = 50 kN
Minimum hook approach = 1.0 m
Distance between wheels = 3.5 m
Self weight of rails = 0.3 kN/m

Q. 5 Design a gantry girder for a mill building to carry one electric overhead travelling crane, having the following data:

1. Crane capacity : 250 kN
2. Weight of crane excluding crab : 200 kN
3. Weight of crab : 60 kN
4. Span of crane between rails : 20 m
5. Minimum hook approach : 1.1 m
6. Wheel base : 3.4 m
7. Span of gantry girder : 7 m
8. Mass of rail section : 30 kg/m
9. Height of rail section : 75 mm

Q. 6 Design a gantry girder to carry one electric overhead travelling crane, having the following data:

1. Crane capacity : 200 kN
2. Weight of crane girder : 120 kN
3. Weight of crab : 50 kN
4. Span of crane girder : 16 m
5. Minimum hook approach : 1.02 m
6. Wheel base : 3.8 m
7. Span of gantry girder : 6 m
8. Mass of rail section : 30 kg/m
9. Height of rail section : 80 mm

Take $f_y = 250\ N/mm^2$

Q. 7 Design a gantry girder to carry one electric overhead travelling crane, having the following data:

1. Crane capacity : 200 kN
2. Weight of crane girder : 150 kN
3. Weight of crab : 40 kN
4. Span of crane girder : 15 m
5. Minimum hook approach : 1.0 m
6. Wheel base : 2.5 m
7. Span of gantry girder : 5 m
8. Mass of rail section : 30 kg/m
9. Height of rail section : 70 mm

Take $f_y = 250\ N/mm^2$

Q.8 Design a simply supported gantry girder to carry one electric overhead travelling crane, given:

Span of gantry girder = 6 m
Span of crane girder = 18 m
Crane capacity = 200 kN
Self weight of crane girder excluding trolley =180 kN
Self weight of trolley = 75 kN
Minimum hook approach = 1.0 m
Distance between wheels = 3.5 m
Self weight of rails = 0.3 kN/m

Determine

(1) The maximum moment and shear forces due to vertical and horizontal loads
(2) Check whether ISMB 600 with ISMC 300 on compression flange is adequate to
    (a) Carry moment
    (b) Carry shear force
    (c) In buckling resistance
    (d) In limiting deflection

Q.9 Design a gantry girder to carry one electric overhead travelling crane, having the following data:

1. Crane capacity	: 350 kN
2. Weight of crane girder	: 190 kN
3. Weight of crab	: 80 kN
4. Span of crane girder	: 18 m
5. Minimum hook approach	: 1.2 m
6. Wheel base	: 4.0 m
7. Span of gantry girder	: 10 m
8. Mass of rail section	: 30 kg/m
9. Height of rail section	: 80 mm

Take $f_y = 250$ N/mm^2

Q. 10 A gantry girder is composed of ISMB 600 @ 122.6 kg/m and a channel section ISLC 300 @ 33.1 kg/m placed on the top of beam with its flange down. Compute (i) Z_e and Z_p; (ii) Combine local capacity; (iii) Biaxial bending, given the following :

(1) Span of gantry girder	: 6.0 m
(2) Crane capacity	: 300 kN
(3) Distance between centre of gantry girder	: 15 m
(4) Weight of crane girder	: 130 kN
(5) Weight of crab	: 70 kN
(6) Minimum approach of crane hook	: 1 m
(7 Distance between centre of wheels	: 3.8 m
(8) Mass of rail section	: 30 kg/m

UNIT-II

Q.1 What is plate girder? Explain its various components with sketches.

Q.2 Derive the expression for the economical depth of a plate girder. Assume moment is resisted by flanges only. Also explain the serviceability requirement for web thickness as per code.

Q.3 Write short notes on following:

(a) Stiffener

(b) Splice

(c) Curtailment

Q.4 Write the design steps for plate girder as per code?

Q.5 Design the welded plate girder for an effective span of 30 m and carrying a uniformly distributed load of 30 kN/m and two concentrated loads of 150 kN each acting at 10 m from both ends. The girder is simply supported at ends. It is fully restrained at both ends against lateral buckling throughout the span.

Load factor = 1.5 ; Yield stress of steel f_y = 250 MPa

Q.6 A welded plate girder is simply supported over an effective span 16 m. It carries a uniformly distributed load of 80 kN/m in addition to its self weight, and two concentrated loads of 400 kN each at 4 m from either support. Design the plate girder completely.

Q.7 Design a welded plate girder of span 40 m to carry on super imposed load of 45 kN/m without using of bearing and intermediate stiffeners. Use Fe 410 (E 250) steel.

Q.8 Design a welded plate girder of span 30 m to carry on super imposed load of 50 kN/m using thin web and end stiffeners. Use Fe 410 (E 250) steel.

Q.9 A welded plate girder is fabricated from two 500 mm× 25 mm plates flange plates and 1500 mm× 12 mm web plate. Find the moment capacity of the girder. The grade of steel is Fe 410. The compression flange is fully restrained. Also check the capacity of a pair of intermediate web stiffeners of size 100 mm × 10 mm for the plate girder.

Q. 10 Design a plate girder for a bridge, for a live load of 80 kN/m, longer than the span and dead load of 40 kN/m. The girder is simply supported over a span of 16 m. Also show the curtailment of the flange.

UNIT-III

Q.1 Differentiate between deck type and trough type bridges, also draw a neat sketch of a deck type plate girder railway bridge and label the components.

Q.2 What is the difference between portal bracings, used in through type truss girder railway bridges? Discuss the use of lateral bracings in steel bridges.

Q. 3 Write the short note on following:-

(a) Gauge, stringer and cross girder

(b) Classification of steel bridge

(c) Loads on bridge

Q.4 Write the design steps of a deck type plate girder bridge?

Q.5 Write the design steps of a through type plate Girder Bridge?

Q.6 Design a deck type plate girder railway bridge for single track B.G. main line loading for the following data:

1. Effective span: 24 m
2. Spacing of plate girders: 1.9 m c/c
3. Weight of stock rails: 440 N/m
4. Weight of guard rails: 260 N/m
5. Weight of fastenings: 280 N/m of track
6. Timber sleepers: 250mm×150mm×2.8 m @ 0.4 m c/c
7. Density of timber: 7.4 kN/m^3

Q. 7 Design a through type plate girder Railway Bridge for single track B.G. main line loading for the following data:

1. Effective span: 25 m
2. Spacing of main girders: 5 m c/c
3. Spacing of cross-beam: 3 m c/c
4. Spacing of stringers: 2 m c/c
5. Timber sleepers: 250mm×150mm×2.8 m @ 0.4 m c/c
6. Density of timber: 7.4 kN/m^3
7. Weight of stock rails: 450 N/m
8. Weight of guard rails: 250 N/m
9. Weight of fastenings: 300 N/m of track

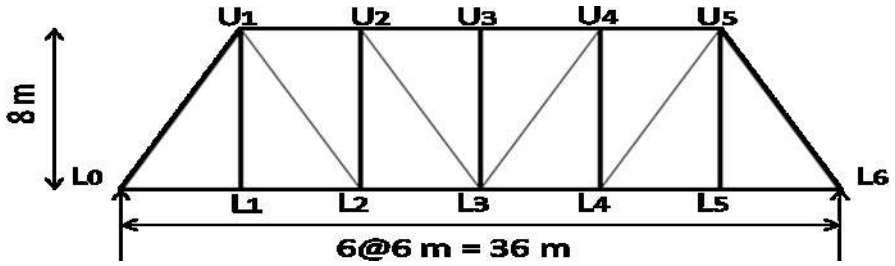
Q.8 Design central section of the plate girders for a deck type railway bridge for single track B.G. main line loading for the following data:

1. Effective span: 20 m
2. Spacing of plate girders: 2 m c/c
3. Weight of stock rails: 460 N/m
4. Weight of guard rails: 280 N/m
5. Weight of fastenings: 290 N/m of track
6. Sleepers: 250mm×120mm×2.8 m @ 0.5 m c/c
7. Density of sleeper material: 78.4 kN/m^3

Q. 9 Design stringer beams in a through type truss Girder Bridge to carry a single track B.G. loading, for the following data:

1. Effective span = 44 m
2. Spacing of stringer c/c = 2.1 m
3. Wt. of stock rails = 460 N/m
4. Wt. of guard rails = 280 N/m
5. Wt. of fastenings = 290 N/m of track
6. Sleepers = 250mm×120mm×2.8 m @ 0.5 m c/c
7. Density of sleeper material: 78.4 kN/m^3

Q.10 (a) Draw I.L.D. for forces in members U_2U_3, L_2L_3 and U_1L_1 of a Pratt Truss Girder shown in fig.



(b) Analysis the A- type portal bracing shown in fig.

UNIT-IV

Q. 1 Write short note on following –

(a) Pressed steel tank

(b) Staging

(c) Ring beam

Q. 2 Write design steps for an overhead circular water tank?

Q .3 Write the design steps for an overhead rectangular water tank?

Q.4 Write the design steps for an overhead pressed steel tank?

Q. 5 Design an overhead circular steel tank with hemispherical bottom for 150 kiloliters capacity. The tank is supported on 6 columns uniformly spaced along the periphery.

Q. 6 Design an elevated steel rectangular tank, with flat bottom for a capacity of 75,000 liters of water. The tank may be assumed to be supported on 6 numbers of columns.

Q.7 Design an overhead circular steel tank with hemispherical bottom, for capacity 1, 80,000 liters. It is supported on 8 columns uniformly placed along periphery, for which M = 0.00827 WR, T = 0.00063 WR and F = W/16 may be taken.

Q.8 For an elevated two tier rectangular pressed steel tank having capacity 130 kiloliters. Design the bottom and side plates. Also design the stays. Draw their arrangements; do not design beams supporting the tank. Also show actual loads coming on an intermediate top tier beam.

Q.9 Design an overhead steel rectangular flat bottom tank of capacity 70,000 liters. The available width of plates is 1.22 m and length up to 6.1 m. The staging consists of 4 columns, spaced 4.88 m×3.66 m and the bottom of the tank is 9.14 m above the ground level. Design also the supporting beams staging need not to be designed.

Q.10 Design an elevated steel tank, circular in shape, for 2, 00,000 liters capacity with circular girder supported six columns. The shape of the bottom may be assumed suitably. The roof covering and staging for the tank need not to be designed. Maximum bending moment and torsion in the circular girder may be taken equal to – 0.01482 WR and 0.00151 WR respectively.

Subject : Repair & Rehabilitation of Structures (CE 604)

UNIT 1

1. Explain briefly about deterioration in concrete.
2. Explain the physical process of deterioration in concrete.
3. Explain abrasion in concrete .
4. Explain erosion in concrete.
5. Explain pitting in concrete.
6. Explain chemical process of deterioration in concrete.
7. Explain carbonation of concrete. Also explain the speed of carbonation.
8. Explain the process of chloride ingress in concrete.
9. Explain Alkali aggregate reaction & their sources.
10. Explain Sulphate attack in concrete & its prevention

UNIT 2

1. Explain the crack formation in concrete
2. Explain the methods for the measurement of cracks in buildings.
3. Explain Non destructive tests in concrete.
4. Explain the functioning of Rebound hammer test
5. Explain advantages of Rebound hammer test
6. Explain various limitations of rebound hammer test.
7. What is ultrasonic pulse velocity test. Explain its working principle.
8. Explain the Electromagnetic method of NDT.
9. Explain the penetration resistance & pull out test.
10. What do you understand by core cutting & its application.

UNIT 3

1. How corrosion affects the concrete .Explain in detail.
2. What are the methods to measure corrosion.
3. Explain half cell potential test
4. Explain concrete resistivity method.
5. Briefly explain potential mapping technique.
6. What are the general requirements for quality repair
7. What are the properties of repair materials & their importance.
8. What is meant by guiniting. explain.
9. Explain ferro-cement and its construction techniques.
10. Explain FRP in detail.

UNIT 4

1. What are the various methods of repair techniques .
2. Explain grouting technique in detail.
3. Explain the difference between pressure & permeation grouting.
4. Explain jacketing in detail.
5. Briefly explain the difference between concrete & steel jacketing.
6. What is meant by shotcrete. explain
7. What is meant by externally bonded plates.
8. How is underwater repairing if civil structures done.
9. What precautions are to be taken in underwater repairing .
10. Explain the equipments used for underwater repairing works.

UNIT 5

1. What preliminary investigations are being done for structures.
2. Explain various in-situ sampling methods for inspection of concrete structures.
3. Explain the survey conducted to verify the structural integrity .
4. Explain various equipments used to measure the deflection in the structures.
5. Explain methods for determination of concrete quality.
6. Explain the method of non-destructive assessment method for in-situ strength.
7. Explain ultra pulse velocity testing method for concrete.
8. Explain the resistivity testing of concrete.
9. Explain any case study for corrosion damaged structure.
10. Explain any case study related to restoration of a heritage building.

Subject : Water Supply Engineering CE 605

UNIT-1

Q1 . Describe the role of an environment engineer in the protection of environment.

Q2. Describe the factors affecting the per capita demand of water supply per day.

Q3. What are the various types of water demand . Desribe the percentage wise distribution of various types of demand.

Q4. Describe the various methods of estimation of population and explain that which type of a method is suitable in which condition.

Q5. The population of a city as per the census records available is as follows:

Census per year	Population
1941	24835
1951	29578
1961	46147
1971	49960
1981	57620
1991	67832
2001	74638

Estimate the population of the city after four decades by arithmetical increase /geometrical increase and incremental increase method.

Q6 State and briefly discuss the factors affecting the demand of water.

Q7 What is design period. Write down the design periods for dams, filter plants, distribution systems and pump houses. What are the variations in demand and their effects on the design of various components.

Q8 Write a brief note on Domestic Water Demand.

Q9 Explain the logistic curve method of population forecasting.

Q10 State and briefly discuss the factors affecting population growth.

UNIT-2

Q1 Explain various method of well development.

Q2 Describe the method of finding the yield of an open well.

Q3 What are the various water borne diseases and their causative agents.

Q4 What are the Indian Standards for the permissible limits of TDS, chloride, fluorides and nitrate in the portable water. What is E-coil and what is its significance.

Q5 Compare the surface and ground water sources of water.

Q6 Write down the physical, chemical and biological water quality standards for drinking water.

Q7 Describe the hydrological cycle with a neat sketch.

Q8 Explain the procedure to find out the turbidity of a given sample of water.

Q9 Estimate the fire demand for a city having population 1,25,000 by using Kuichling's formula.

Q10 Explain the procedure to determine the hardness in water.

UNIT-3

Q1 Describe the various type of pumps and the criteria of selection of a pump and site for pumping station.

Q2 A city has a population of 1,50,000. Water is to be supplied at the rate of 200 lt. per capital per day. The static lift is 50m. The length of 500mm dia. Rising main is 300m. Efficiency of pump is 70% and that of motor i s 80%, f=0.04 and peak factor =1.5. calculate the required horse power of the pump.

Q3 Describe the various types of settling. Find the settling velocity of spherical particle and specific gravity 2.67 with a diameter of 0.004 cm at 25C in water.

Q4 Design a rectangular sedimentation tank for the following data:-

(i) Vol. of water to be treated=3MLD
(ii) Detention period=4Hour
(iii)Velocity of flow=0.1m/min.

Q5 What is meant by water softening. Explain any one method of softening of water.

Q6 Discuss the role of alum as a coagulant. How do we find the optimum dose of alum in laboratory.

Q7 Describe various types of joints in pipes with neat sketches.

Q8 What is the purpose of aeration in water treatment.

Q9 What is the coagulation. Name different coagulants used for water treatment and give the chemical reaction involved in the process.

Q10 In a continuous flow sedimentation tank 4m deep and 60 m long what flow of velocity of water is required for effective removal of 0.025mm. dia. Particle at 25C . The sp. Gravity of particles is 2.65 and kinematic viscosity of water is 0.01 cm^2/sec.

UNIT -4

Q1 Explain the working of a rapid send filter with a neat sketch. What are the desirable qualities of filter media.

Q2 Design 6 slow sand filter beds from the following data:-

(i) Population=60000
(ii) Per capita demand=180litre/capita day
(iii)Rate of filteration=200litre/m^2/hr
(iv)Peak factor=1.8
(v) L:B ratio=2

Assume that 1 unit is kept as stand by out of the 6

Q3 Describe the factors affecting bactericidal efficiency of chlorine.

Q4 Explain various methods of disinfection of water

Q5 Draw the flow diagram of the units of treatment plant and explain the working and head loss in each unit.

Q6 Compare the slow sand filters and rapid gravity filters.

Q7 Find the quantities of bleaching powder to treat 20 millions litres of water per day. The dose of chlorine is 0.45 mg/ltr and the available chlorine its 30%.

Q8 Discuss the role of chlorine as disinfectant. How do we calculate the amount of bleaching powder required per litre of water to be disinfected.

Q9 Draw the typical section of a rapid gravity filter and explain its working and operational problem.

Q10 Write short notes on:-

(a) Jar test
(b) Ozone as disinfectant
(c) Post chlorination
(d) Super chlorination

UNIT-5

Q1 Explain ad sketch the various components of a domestic water service connection.

Q2 Describe various methods of distribution and give the values of residual pressure at ferrule for different storied buildings.

Q3 Describe hardy –cross method of pipe network analysis.

Q4 Describe the various components of distribution system.

Q5 Describe the equivalent pipe method for design of pipe network with suitable example.

Q6 Describe the various types of distribution networks and compare them.

Q7 Write short note on distribution reservoirs.

Q8 Describe various types of pumps being used for water supply systems.

Q9 Describe the various methods of water distribution with neat sketch.

Q10 A pipeline 0.8m diameter is 2.8 km. long to augment the discharge, another pipeline of the same diameter is introduced parallel to the first pipeline in the second half of its length. Find the increase in discharge if f=0.03 and the head at the inlet is 36m.

Subject: Building Technology & Planning (CE606)

UNIT-1

1. Discuss the different type of building in detail?
2. What are the factors of affecting the selection of site? Explain?
3. Discuss the different method of drawing sun chart or sun path and use of sun path diagram?
4. Write about the passive solar cooling and heating?
5. Describe the types of sun shading devices?
6. What do you understand by energy conservation in building and what techniques are used for the
   same?
7. Differentiate between:
   (i) Commercial buildings
   (ii) Institutional building.

8. List various factors to be considered in the planning of a building, with the help of sun diagram?
9. What is meant by sun shading devices? State and discuss the different type of sun shading device?
10. Write down the information gives by site plan and also write down that factor considered in selection of site?

UNIT-2

1. What do you understand by climate? Discuss the elements of climate?
2. What are the comfort considerations in a building located in hot and dry climate.
3. Explain the orientation of buildings? Discuss the factor affecting orientation of building?
4. Define orientation. Discuss the criteria used in deciding orientation of buildings under India Conditions?
5. How many Climatic Zones in are there India? Briefly explain?
6. What are the objects of building bye laws?
7. What are the comfort considerations in a building located in hot and dry climate?
8. Explain the building bye laws w.r.t
   (i) Open space requirement
   (ii) Height and size limitation
   (iii) Plinth area regulation
   (iv) Built up area
9. Write down your suggestions for optimum orientation of buildings?
10. Write short notes on:
    (i)Building Bye – Laws
    (ii)Set back
    (iii)Covered area
    (iv)FAR

UNIT 3

1. Explain the term principal of planning? Discuss the various factors affecting the principal of planning?
2. Write different factors which affect building planning.
3. How is a site selected for residential building according to Vastu Shastra?
4. What is Vastu Shastra and how this technology to construction of building is differ from the modern science?

5. Explain with neat sketch orientation and planning of a residential building w.r.t. vastu?
6. State the direction and factors considered in vastu shastra and its importance in buildings?
7. Explain the significance of roominess and circulation in planning of a residential building?
8. Why roominess and furniture requirement is important while planning a building?
9. Briefly explain
   (i) aspect
   (ii) prospect
   (iii) furniture requirement
   (iv) roominess
10. Explain the following
   (i) grouping,
   (ii) circulation,
   (iii) elegance,
   (iv) privacy

UNIT 4

1. Write short notes on
   (i)Area planning
   (ii)Living area
   (iii)Sleeping area
   (iv)Service area
2. Draw plan of a college library showing all functional activities and detail of furniture
3. Explain accommodation requirement in a residential building in detail
4. Draw plan of a primary health centre showing all functional activities and detail of furniture
5. Design and draw a residential building on a plot of 35'X65'? assume suitable date which are not given?
6. A residential house is to have the following rooms:
   (i) Bed room@1: 12'10"X9'3"
   (ii) Bed room@2:8'11"X18'0"
   (iii) Dining room: assume

(iv) Living room: assume

(v) Verandah: width of 10'

7. Write a short note on design of post office and also write accommodation requirement for post office design?
8. Draw a complete plan for a bank? Assume suitable data?
9. Draw a complete plan for a hospital with following accommodation:
   (i) Consultancy room @ 6
   (ii) Gynecology room @1
   (iii) Sore room
   (iv) Toilets @ each sex
   (v) Wards @2 @for individual sex
   (vi) Reception area
10. Draw a plan of a primary school building? Assume suitable data?

UNIT 5

1. What is importance of lighting and ventilation in a public building?
2. Explain various means of sound insulation and noise control?
3. Explain the different type of door with neat sketches?
4. What is the objective of ventilation in building? Discuss the various methods of artificial ventilation
5. What do you understand by acoustics of buildings? Explain?
6. Explain the term sound insulation?
7. Write a short note on "acoustical defects"?
8. Draw a neat sketch of partly glazed and partly Panelled door?
9. Differentiate between the following
   (i) Acoustics and sound insulations
   (ii) Indoor noise and outdoor noise
10. Discuss briefly the following aspects as applied to doors and windows
    (i) Purposes
    (ii) Location
    (iii) Sizes and
    (iv) Materials

Subject: Earth Quake Resistant Design & Construction (CE 701)

UNIT 1

1. Define the following terms with respect to earthquake

   (i) Hypocenter (ii) Focal depth

   (iii) Epicentral distance (iv) Magnitude of earthquake

2. Discuss the causes of earthquakes on the basis of plate tectonics
3. Discuss the origin of Tsunami waves and their propagation
4. Describe the various scales for measuring earthquake intensity and energy
5. Describe the various seismic waves and their propagation inside the earth
6. What is magnitude of earthquake? Explain energy of earthquake and its different intensity scales
7. What do you understand by seismic zoning?
8. Explain the causes of Earthquake and also explain the theory of Plate-Tectonics?
9. Write down the classification of earthquake?
10. What are the induced hazards of an earthquake?
11. Write short note on MMI and MSK intensity scale?
12. Define the following terms with respect to earthquake
    (i) Surface waves
    (ii) Body waves
    (iii) Seismology
    (iv) Seismic zoning

UNIT 2

1. Draw a diagram of a seismograph showing different part of it. Explain the different type of waves coming to recording station during earthquake

2. Describe the working principles and construction of the various eqrthquake recording instruments

3. Discuss the effects of earthquake on buildings. Describe the typical failure mechanisms of masonry buildings under earthquakes. Discuss the ways to minimize the risk of failure of buildings?

4. Drive the equation of dynamic equilibrium for a building subjected to earthquake motion?

5. What is Fundamental natural period? Explain the factors on which it depends?

6. Explain the following w.r.t. the equation of dynamic equilibrium:

   (i) Inertia forces

   (ii) Restoring forces

   (iii) Damping forces

7. What is the difference between static and dynamic load? Explain with the help of example?

8. Discuss the advantages and disadvantages of masonry construction?

9. Explain the term flexural and shear walls with the help of a neat diagram?

10. What is the difference between In plane and Out plane failure of a masonry building?

11. What do you mean by rigid and flexible diaphragm? What causes the failure of diaphragm?

12. How does the opening in walls affect their performance during earthquake motion?

13. Explain connection failure in a masonry building?

14. Explain

    (i) Define pounding of building

    (ii) Non structural failure in buildings

UNIT 3

1. Explain the weaknesses of masonry construction which are responsible for its low seismic resistance?
2. What draw a leveled figure showing are the types of construction usually adopted in buildings? Explain them?
3. How does the configuration of buildings affect its seismic performance?
4. Give the categories of buildings as per IS 4326:1993?
5. Explain the various guidelines given by IS 4326:1993 for construction of a masonry walls?
6. What is band? Why it is necessary to provide bands in masonry constructions?
7. What are the seismic strengthening arrangements for masonry construction? Explain?
8. What are Dowel bars? Where are they provided?
9. "Timber construction is suitable for earthquake resistant construction of building". Explain this statement?
10. Draw a leveled figure showing connection of timber column with the foundation?
11. Explain the type of framing in timber construction?
12. Why is it necessary to provide "Through stone" in stone masonry walls? Give various guidelines with diagrams for using through stone masonry walls?
13. Why monolithic constructions is suitable for high seismic zone. Explain the term in detail with diagram according to code provision

UNIT 4

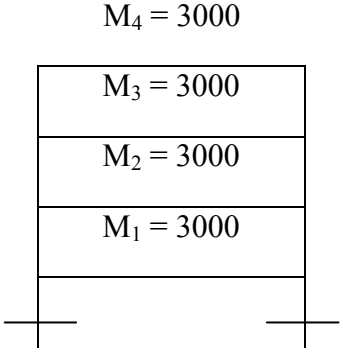
1. What are the various aspect ratio in a building. Explain the middle third rule according is 1893 – i.
2. Explain why strong column – weak beam configuration is preferred for making earth quake resistant building?
3. "Beams must be weaker than the columns "explain this statement with neat sketch.

4. Write down the steps involved for design structure according to is 13920?

5. What are the various aspect ratio in a building? Explain the middle third rule according is 1893?
6. Why the lower story of buildings is designed stronger than the upper storey?
7. Explain the effect of soft storey? Draw the suitable cross sectional diagram of this?
8. Explain the short column effect and where it is found? Explain why it is dangerous for buildings?
9. Draw a leveled diagram showing transverse reinforcement and ties in columns?
10. What are special confining reinforcement? Explain in detail?
11. According to IS 13920 explain and draw the beam column joint?
12. What is shear wall in RC frame? What are the provisions for design of this shear walls?

UNIT 5

1. A 4 storey R.C. frame building is shown in figure is situated in Jaipur. The height between the floor is 3.5 m and the total height of building is 14m. The soil below the foundation is hard rock. Assume building is intended to be used as hospital. Determined the total base shear as per IS 1893:2002?



2. Discuss the seismic design philosophy of IS 1893 (part-I): 2002 code. Explain taking suitable examples.

3. Discuss the various methods for earthquake analysis of multistory frames.

4. Write down the design steps for a building according to IS 1893

5. Make a list of load combination according to IS 1893 for a effective designing. If we do not apply these load combination what are effects?

6. Design a 5 stored RCC framed building shown in figure with imposed load 4.0kN/m^2 and it is to be constructed in delhi

Columns have the size = 300X300 mm

Beam have the size = 300X400mm

Thickness of slab = 110mm

Building is SMRF type and are constructed for hospital. The soil below the foundation is medium type

Take floor height is 3.2 m

Subject: Estimating & Costing (CE702)

UNIT-1

1. What is the difference between Estimate & Tender. State their relevance in Civil Engineering Projects.
2. Explain various types of estimates normally used in construction projects, giving an example each.
3. Briefly explain the purpose & importance of estimate in civil engg. Projects.
4. What are the basic principles of estimating in Engineering projects.
5. Explain various methods of taking out quantities of different items of work.
6. Explain the mode of measurement as per Indian Standard for different items.
7. Enumerate the difference between measurement sheet & abstract sheet.
8. What do you understand by bill of quantities? Give an example.
9. Explain the difference between revised & supplementary estimate.
10. Write a draft original estimate for a building

UNIT-2

1. Prepare complete rate analysis for an R.C.C (1:2:4) work in column of 10 cubic metre including labour ,formwork etc
2. Prepare complete rate analysis for brick work (1^{st} class) in c.m (1:6) for 10cu.m incl. labour etc.
3. Explain the various task calculation procedure for an average artisan.
4. What are the various factors involved in calculating the rate of an item.
5. What is the procedure to calculate the material requirement for a masonry work.
6. Explain the procedure to calculate material requirement in RCC work through an example.
7. What is C.S.R(Current schedule of rates) pertaining to the area where any project is envisaged.
8. Prepare rate analysis for cement mortar plastering work on new surface of 12mm thick in the ratio of 1:8 in 10 sq. m area.
9. Prepare rate analysis for marble flooring of 10 sq.m with 25mm bed thickness .
10. Prepare a rate analysis for 150 mm water bound macadam surface (for an area of 10sq.m)

UNIT-3

1. Enumerate various steps in preparing a detailed estimate of a residential building having G+2 height.
2. Prepare an estimate of construction upto plinth level for a room of size 3mx 3m(internal) with 2 nos of footing 500mm & 600mm wide & PCC(1:4:8) 1000mm wide. Depth of both footings may be taken as 300mm & P.C.C of 150mm.Wall thickness may be taken as 300mm.

3. Prepare an estimate of construction above plinth level for the superstructure (as mentioned in above question) considering a door of size 1mx2m & window 1.5mx1.5m. Take RCC roofing slab of 150mm thick.
4. Prepare a detailed estimate of a sanitary block of a factory building.
5. Prepare an estimate of an underground water tank for a storage capacity of 10,000 litres in brick masonry
6. Prepare an estimate for a septic tank with soak well, assuming it to be in brick masonry.
7. Prepare an estimate of a slab culvert taking into consideration excavation, slab, RCC & brick masonry.
8. Prepare an estimate for earthwork of a road in cutting. Assume the section to be trapezoidal.
9. Prepare an estimate of a RCC retaining wall in proportion 1:1.5:3.
10. Prepare an estimate for an RCC column & its footing in proportion of 1:1.5:3.

UNIT 4

1. Explain the factors affecting the cost of work for various buildings.

2. What are the overhead charges & what is the procedure to incorporate it in large projects.

3. What do you understand by Contingencies .

4. What are work charge establishment & where they are used.

5. What are the various percentages for different services in building normally taken.

UNIT 5

1. What is the purpose of valuation of buildings in civil Engineering.
2. Explain the term depreciation used in estimation.
3. What do you understand by sinking fund.
4. Explain the use of scrap value in calculating the estimate of building.
5. What are the various methods of valuation for lands with building.

Subject: Advanced Structural Analysis (CE703)

UNIT – 1

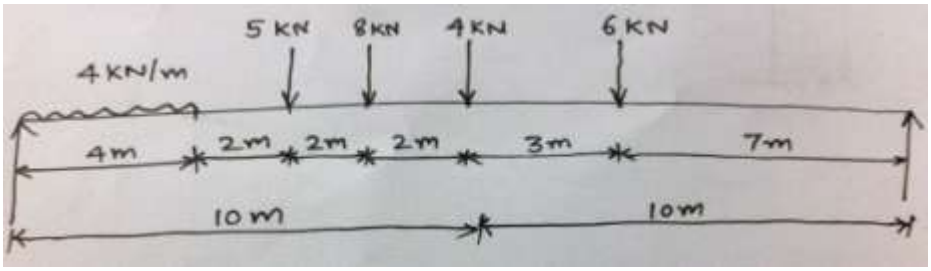
Q.1 The following system of the wheel loads cross a span of 25m.

Wheel loads(KN)- 16 16 20 20 20

Distance B/W centres(m)- 3 3 4 4

Find the Maximum value of Bending Moment and shearing force in the span?

Q.2 A simply supported girder AB span 20m is loaded as shown in fig. Using influence line calculate the shear force and bending moment at a section 8m from the left support when the 4 KN load is at centre of span ?

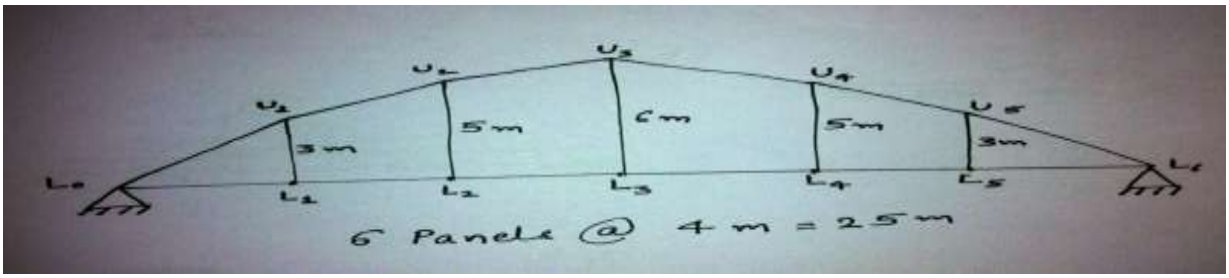


Q.3 A uniformly distributed load of intensity 25kN/m of length 6m crosses girder of length 30m. Calculate the maximum S.F. and B.M at section 10m from the left hand support and the maximum S.F. and B.M diagram?

Q.4 Define influence line and state Muller Breslau's principle and explain its use of drawing influence line diagram in statically determinate and statically indeterminate beams?

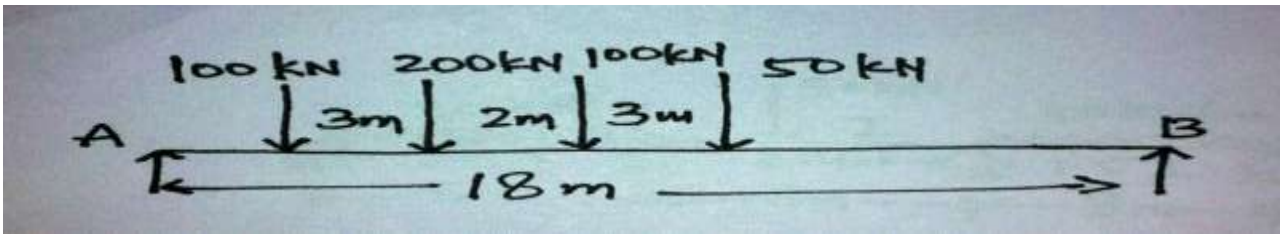
Q.5 Two points loads of 4kN and 6kN space 6m apart cross a girder of 16m span. Draw the influence line for bending moment and S.F. for a point 4m from the left abutment and find the maximum bending moment and shear force at that point?

Q.6 Draw the influence lines for member forces in member U_1U_2 , L_1L_2 and U_2L_2 for pin jointed truss shown in fig. below.

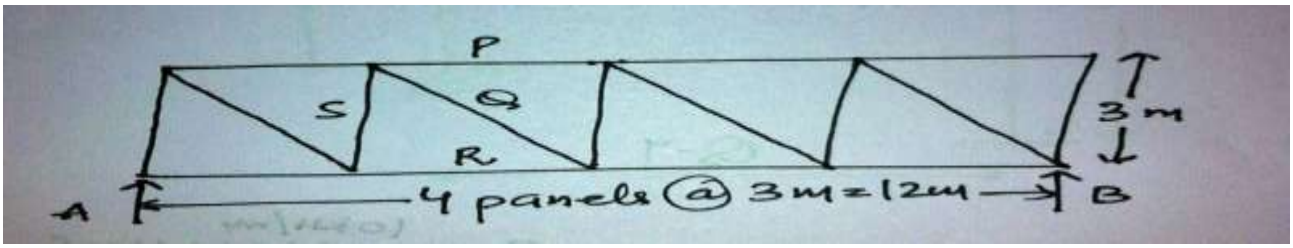


Q.7 A live load of 5kN/m 8m long moves on a simply supported beam of span 10m. Find the maximum bending moment which can occur at a section of 4m from the left end?

Q.8 A girder having a span of 18m is simply supported at the ends.It is traversed by a train of loads as shown in fig., the 50kN load leading. Find the maximum bending moment which can occur (i) under the 200kN load, (ii) under 50kN load, using influence line diagrams.

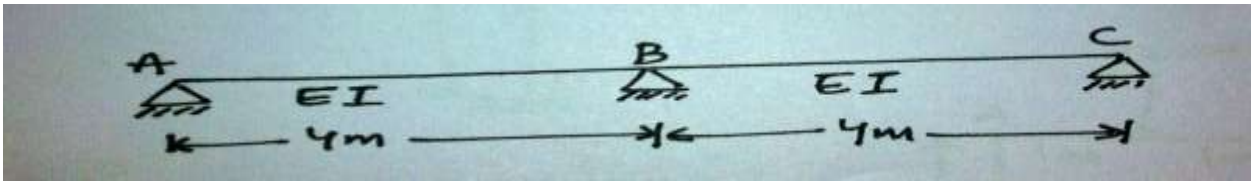


Q.9 Draw influence lines for forces in the members P,Q,R and S of truss shown in following fig.



Q.10 (a) What do you mean by rolling loads and why the analysis of a structure is required under rolling load? Give an example?

(b) Deterimne the influence line for R_A for the continuous beam shown in fig. below. Compute the ordinattes at every 1m interval?

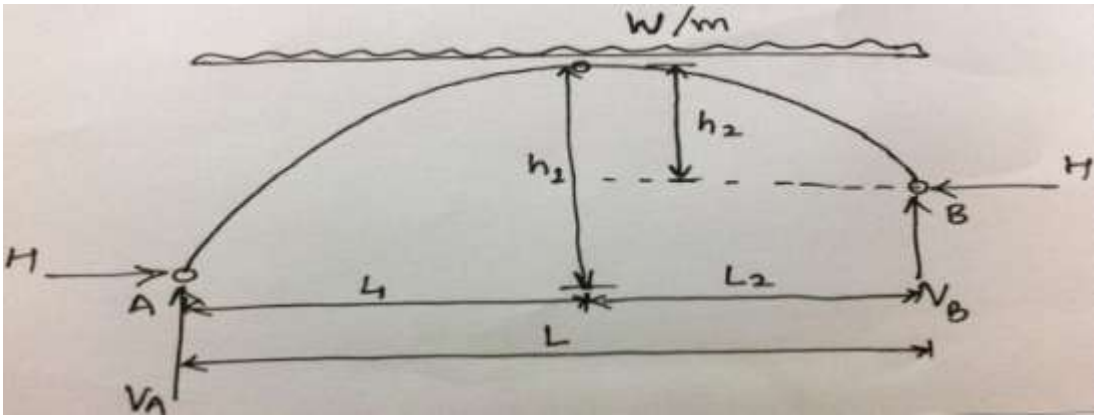


UNIT -2

Q.1 Derive the expression for horizontal reaction "H" for a two hinged parabolic arch subjected to a point load "W" at a distance "αL" from the support. Take "L" as span of arch and "r" as rise of arch. Assume that the second moment of area varies as the secant of slope of the rib axis for the arch

Q.2 An arch in form of a parabola with axis vertical has hinges at the abutments and the vertex. The abutment are at different levels , the horizontal span being L and the Heights of vertex above the abutment being h_1 and h_2.Show that the horizontal thrust due to a load w/unit length uniformly distributed across the span is-

$$WL^2 /2(\sqrt{h1} + \sqrt{h2})^2$$



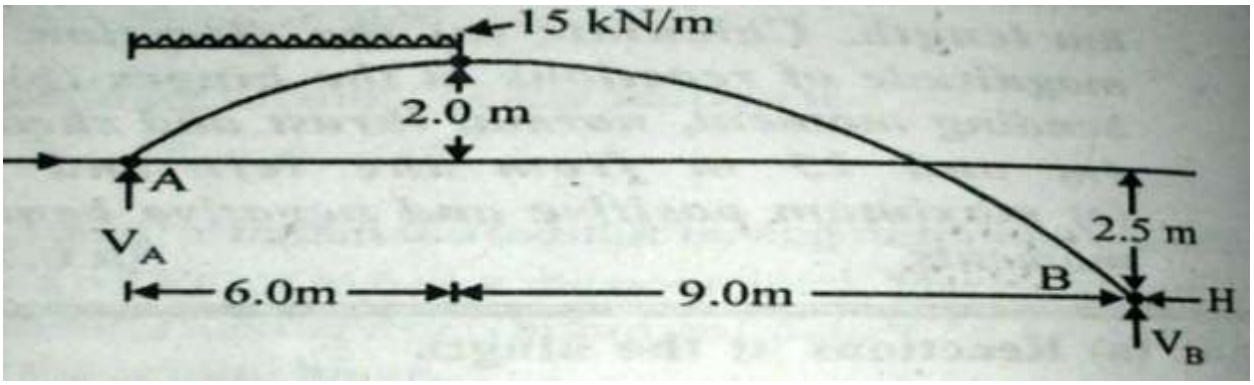
Q.3 (a) State the Eddy's theorem ?

(b) A three hinged parabolic arch of 20 m span and 4 m central rise comes a point load of 4kN at 4m horizontally from the left hand hinge. Calculate the normal thrust and shear force at the section under the load. Also, calculate the maximum bending moment positive and negative?

Q.4 A parabolic arch hinged at the springings and crown has a span of 20m. The central rise of the arch is 4m.It is loaded with a uniformly distributed load of intensity 2kN/m on the left 8m length. Calculate (a) the direction and magnitude of reactions at the hinges (b) the bending moment, normal thrust and shear at 4m and 15m from the left end (c) maximum positive and negative bending moments?

Q.5 (a) Develop the expression for B.M. in arches using Eddy's theorem .

(b) Calculate the horizontal thrust of the arch and the position and magnitude of max. positive bending moment of three hinged parabolic arch with supports at different levels?



Q.6 A two hinged parabolic arch of span 18m and rise 3.60 carries two concentrated loads of 23kN each at crown and at the left quarter span section. Find the horizontal thrust at each support and the bending moments at the loaded sections?

Q.7 Derive the expression for maximum positive and maximum negative B.M. diagram for symmetrical suspension bridge with three pinned stiffening girder of length L subjected to a point load W at a distance αL from left side/

Q.8 The three hinged stiffening girder of a suspension bridge of 100m span is subjected to two points loads of 10kN each spaced at 20m, 40m respectively from the left hand hinged. Determine the Bending moment and shear force in the girder at 30m from left end. Also determine the maximum tension in the cable which has a central dip of 10m?

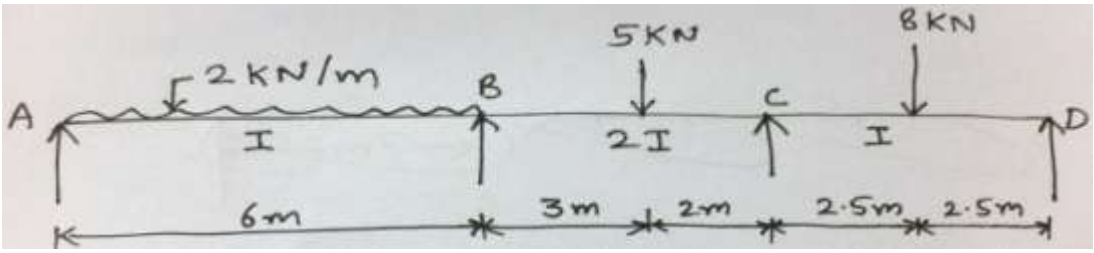
Q.9 The horizontal span of a suspension cable is 300m. The right hand support B is higher than the left hand support A by 50m. The dip of the lowest point C below A is 10m. The cable supports a stiffening girder weighing 2.5kN/m which is hinged vertically below A,B and C. Calculate the maximum tension which occurs in the cable when a wheel load of 200 kN crossed the girder from the left to right?

Q.10 A suspension cable has a span of 160m and a central dip of 16m and is suspended from the same level at both supports. The girder carries a single concentrated load of 8 kN at a point 40m from left end. Assuming equal tensions in the suspension hangers . Calculate (i) the horizontal tension in the cable and (ii) the maximum positive and negative bending moment.

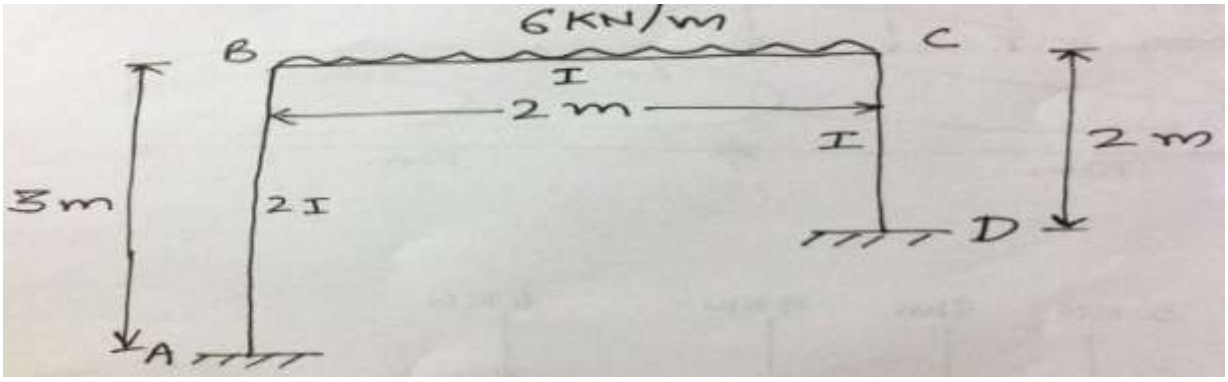
If the 8kN load rolls from left to right, what will be the value of absolute maximum B.M. and S.F?

UNIT- 3

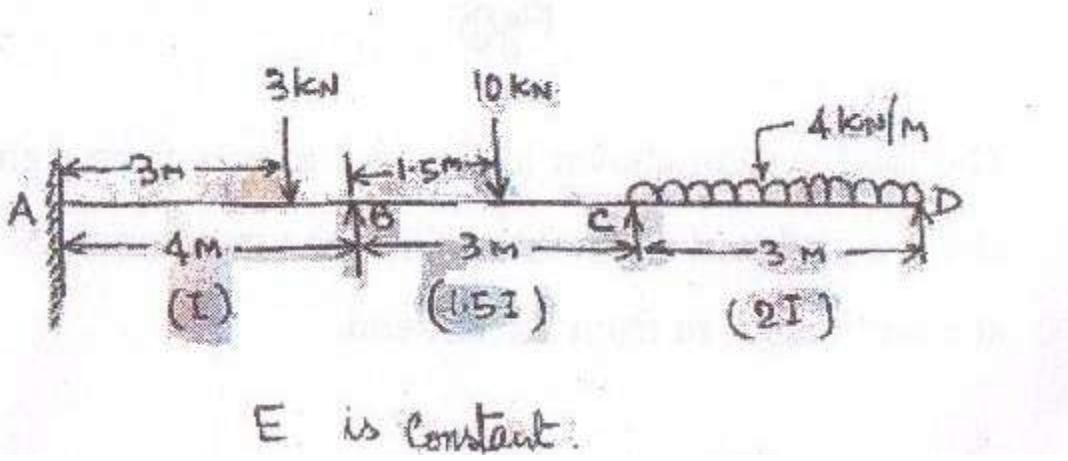
Q.1 A continous beam ABCD consists of three spans, and is loaded as shown in fig. Ends A and D are hinged. Determine the bending moments at the supports, using Kani's method. Also plot the bending moment diagram?



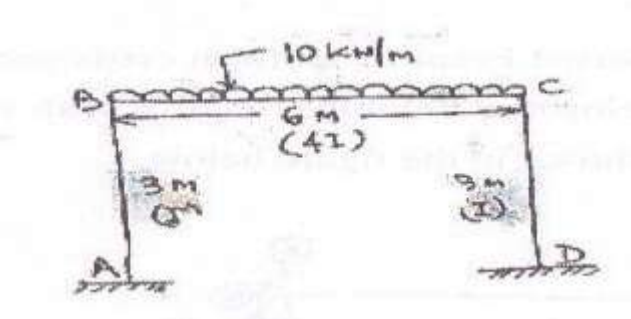
Q.2 Draw the bending moment diagram of the frame as shown in fig. using Kani's method(sway) ?



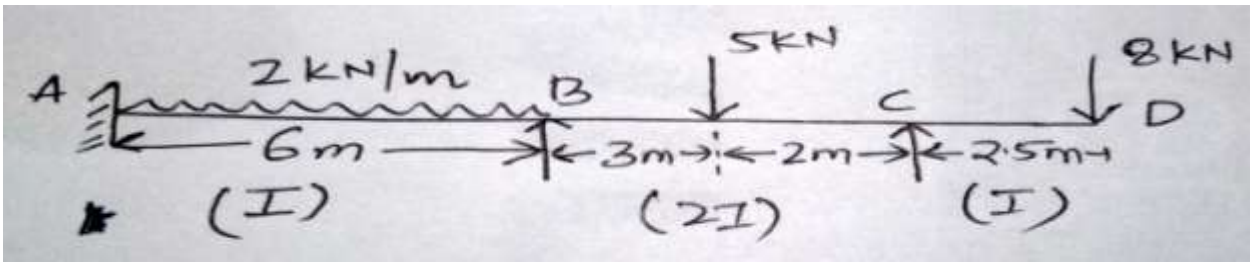
Q.3 Determine the support moments for the continuous girder shown in figure:



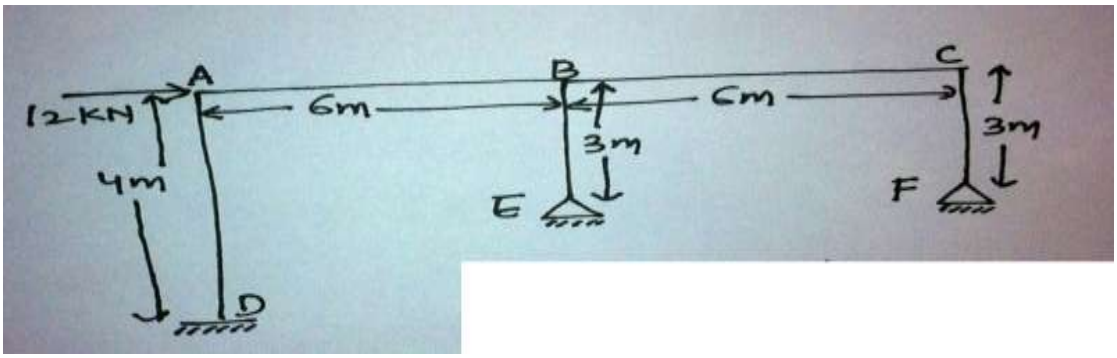
Q.4 Determine the moments at ABCD for the portal frame loaded as shown in figure:



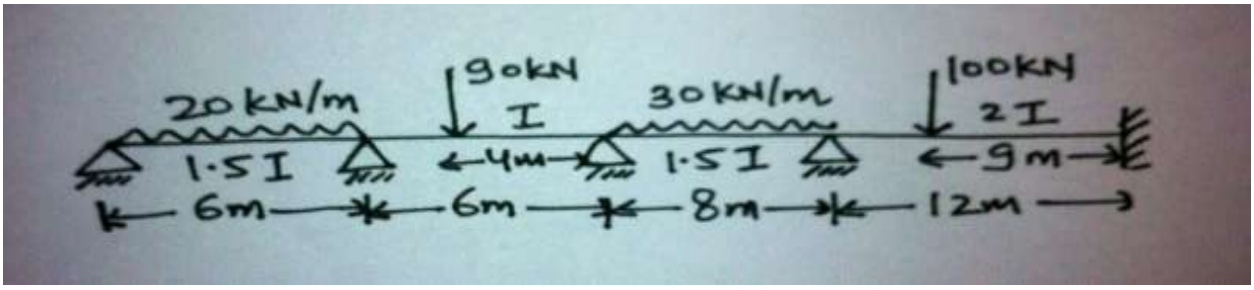
Q.5 A continuous beam ABCD is detailed with loading in fig. CD is overhang support A is fixed. Determine the bending moment at support using Kani‘s method only. Draw B.M diagram



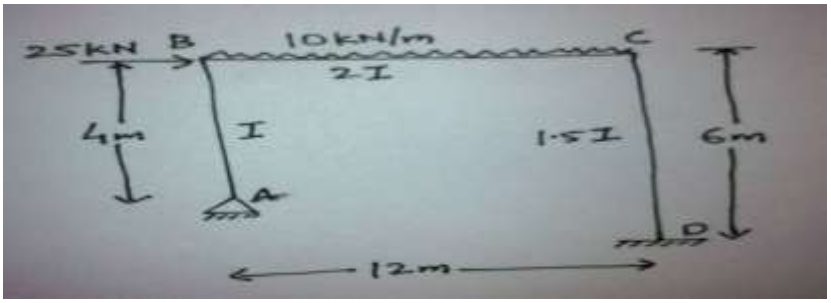
Q.6 Analyze the frame shown below using Kani’s method(EI = constant for all members).



Q.7 Analyze the beam shown in fig.by Kani’s method.Draw B.M.D.



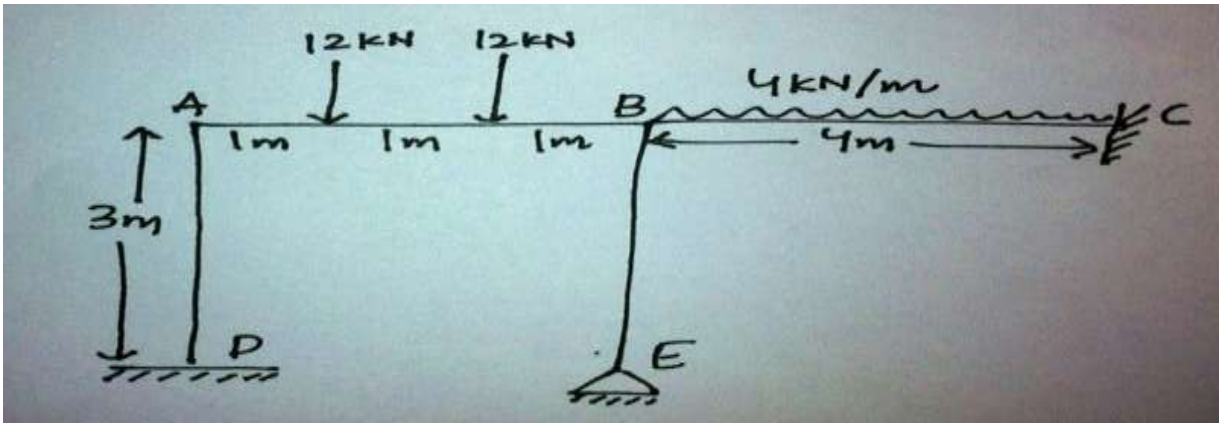
Q.8 Analyze the frame shown in fig.by Kani’s method.Draw B.M.D.



Q.9 (a) Compare the Kani's and Moment distribution method.

(b) Derive the expression for rotation contribution factor and sway factor for a frame having unequal column lengths,cross-sectional area and end conditions.

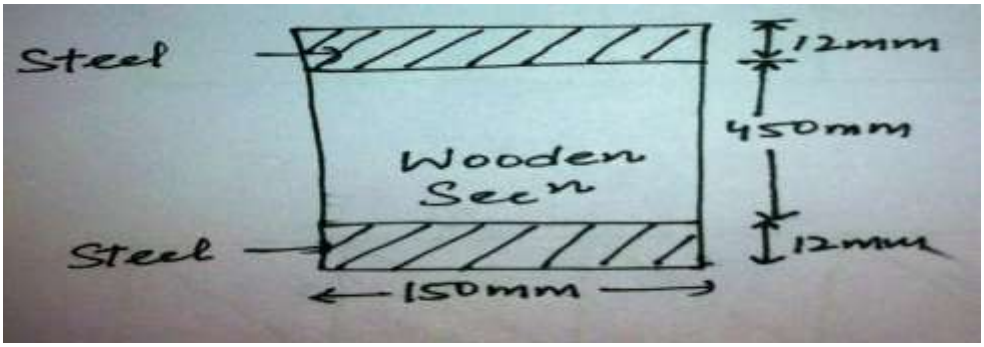
Q.10 A continous beam shown in fig. has rigidly fixed ends Cand D, is pinned at E and has rigid joints at Aand B. The members are of uniform section and material throughout. Sketch the bending moment diagram for the frame, showing all important values.Also, find the values of the horizontal and vertical reaction at D and E. Use Kani's method.



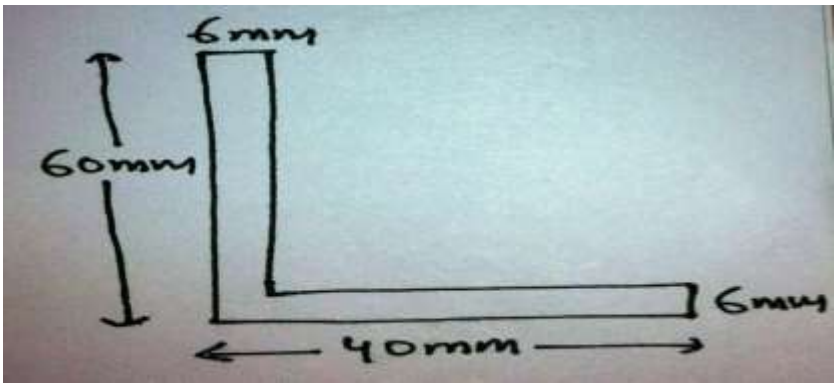
UNIT- 4

Q.1 State the assumptions made in flexural analysis of composite section. How do we obtain the stresses in a composite section?

Q.2 A composite beam is made of wooden section 150x450 embedded between two steel plates of thickness 12mm as shown in fig. below. The effective span of beam is 6m.If the permissble stresses in wood and steel are 50 and 165 MP_a respectively find the maximum intensity of udl safety carried by the beam (E_s/E_w may be taken as 25)



Q.3 Determine the principal moment of inertia for an unequal angle 60x40x6 as shown in fig. Also find the other parameters required for finding the bending stress.



Q.4 200x150x10mm unequal angle is placed with the longer by vertical and is used as a beam. It is subjected to a bending moment of 25kN-m acting in the vertical plane through the centroid of the section. Determine the maximum bending stress induced in the section?

Q.5 Explain the analytical method for locating the neutral axis?

Q.6 Develop the expression for centroidal principal axis for section subjected to unsymmetrical bending?

Q.7 What do you understand by unsymmetric bending of a beam?

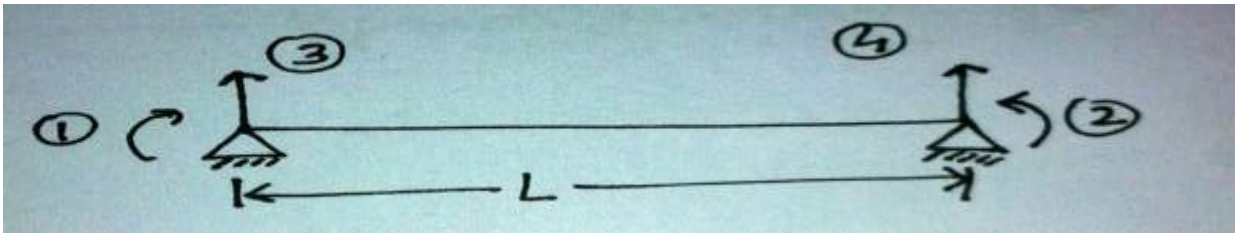
Q.8 Derive the expression for finding out bending stress at any point of a section subjected to B.M. in a plane inclined at an angle Θ with one of the principal plane?

Q.9 What do you understand by Shear centre? Derive the expression shear centre for unsymmeterical channel section?

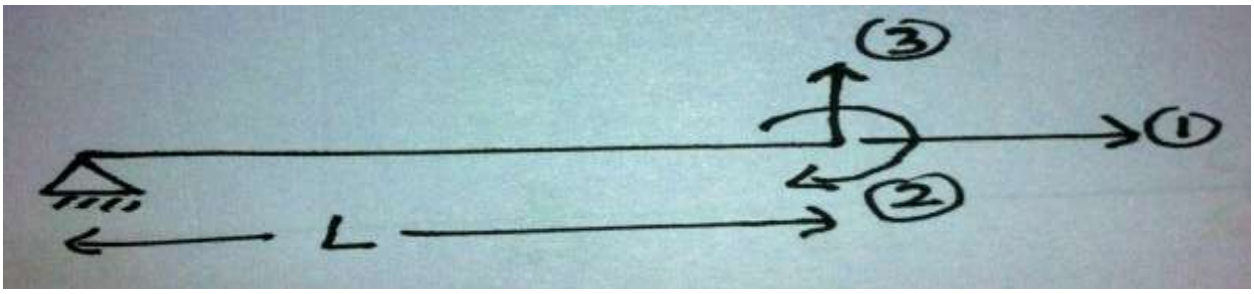
Q.10 A beam of rectangular section,80mm wide and 120mm deep is subjected to a bending moment of 12kN-m. The trace of the plane of loading is inclined at 45^0 to the Y-Y axis of the section. Locate the neutral axis of the section and calculate the maximum bending stress induced in the section?

UNIT-5

Q.1 For simply supported beam of uniform cross section shown in fig. Develop the flexibility matrix with reference to the coordinates shown in figure below.

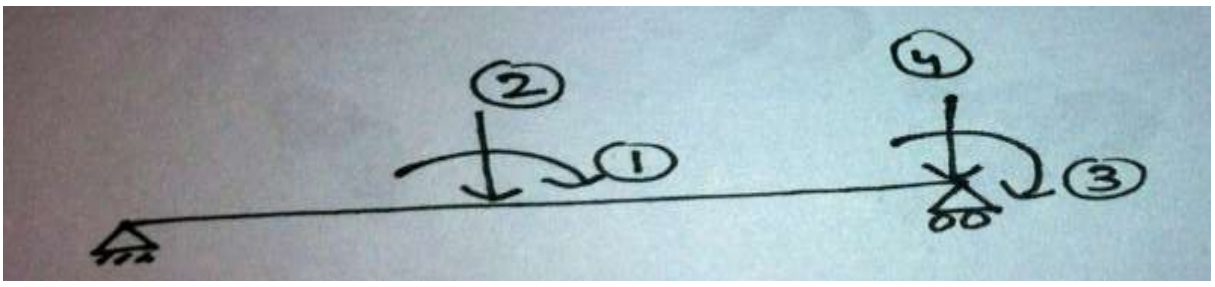


Q.2 Develop the stiffness matrix for beam AB of uniform cross section shown in below with reference to the coordinate shown in the fig. below. End A is hinged and end B is free?

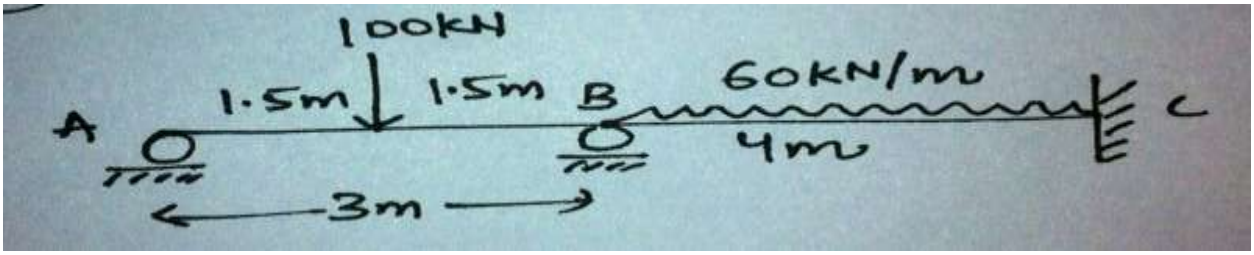


Q.3 Develop the stiffness matrix for the end loaded. Prismatic member AB with reference to the coordinates as shown in fig

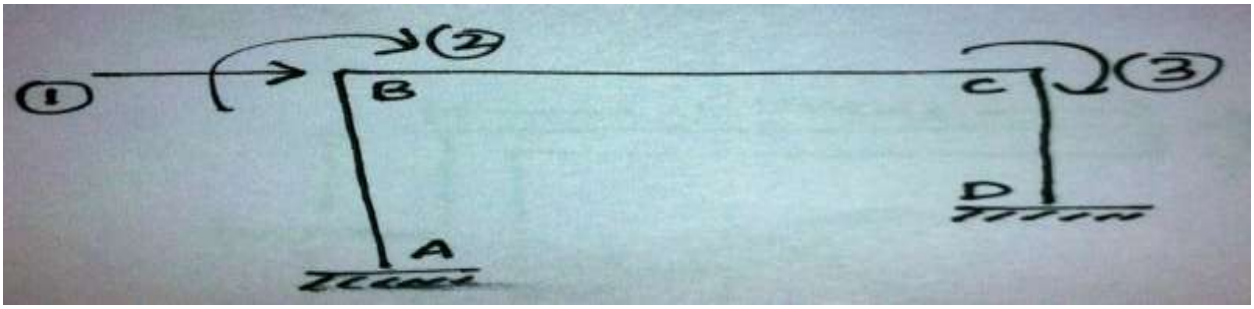
Q.4 Develop the flexibility matrix for the simply supported beam AB with reference to coordinate shown in fig.



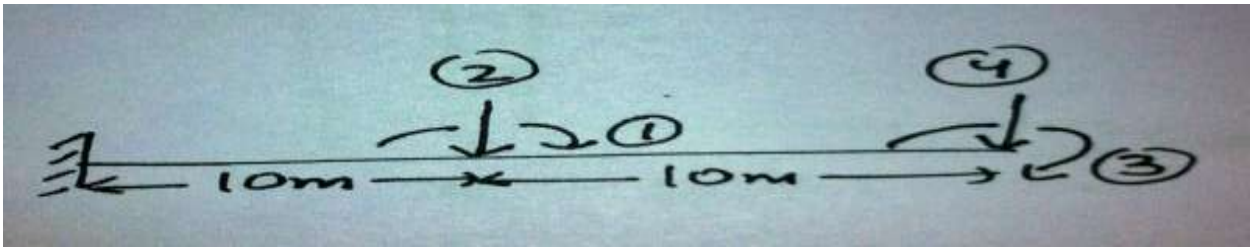
Q.5 Analyze the continuous beam shown in fig. by using force method?



Q.6 Develop the stiffness matrix for the portal frame with reference to the coordinates shown in fig.

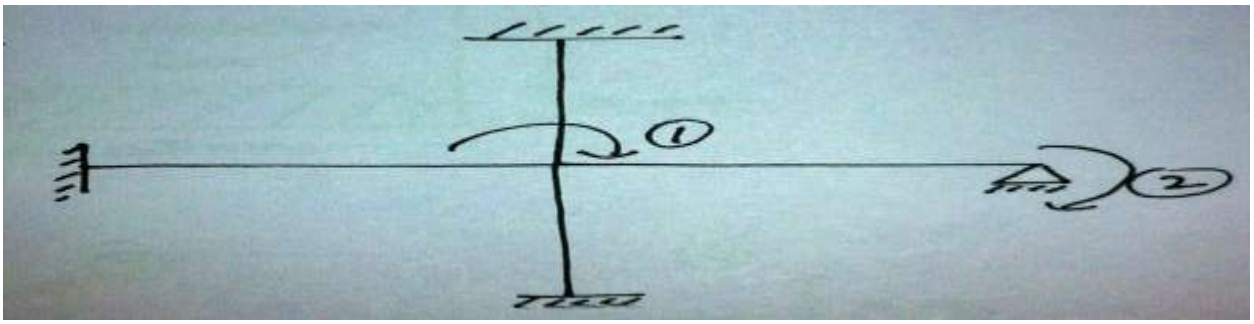


Q.7 Develop the flexibility and stiffness matrices for beam AB with reference to the coordinates shown in fig.

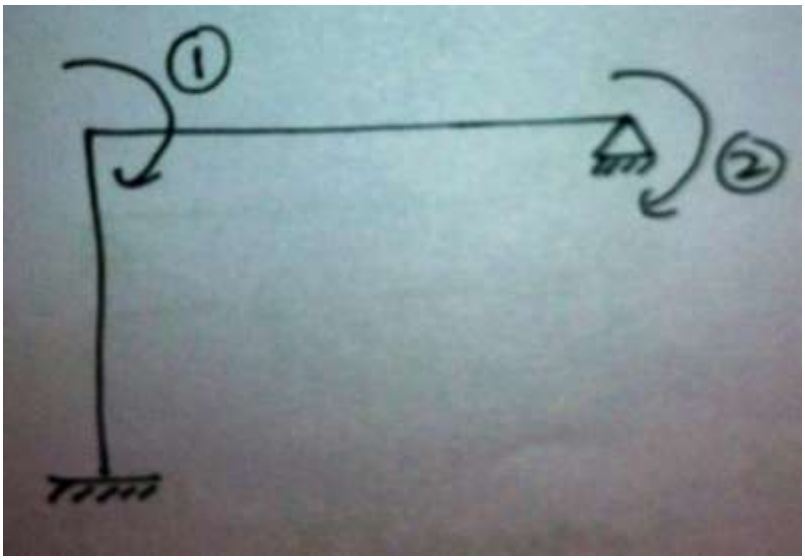


● For the structure shown in fig, develop the flexibility or stiffness matrix, whichever is easier with reference to the coordinates indicated in fig.

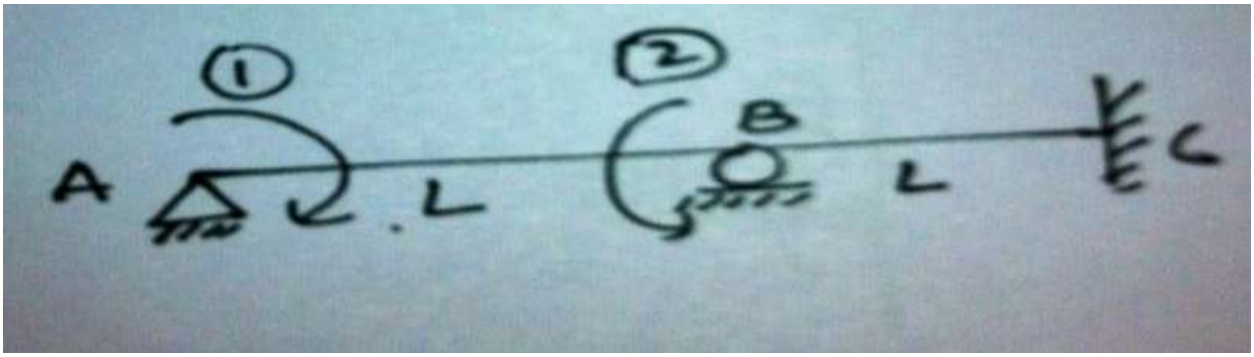
Q.8



Q.9



Q.10



Subject: Sanitation Engineering (CE 704)

UNIT - 1

1. What is the basic purpose of sewage treatment? How it is different from water treatment? Describe the role of an environmental engineer in the protection of environment.

2. Define the following terms:

(i) BOD (ii) COD

(iii) TOC (iv) Sanitary Sewage

(v) Domestic Sewage (vi) Industrial Sewage

(vii) Waste Water

3. Describe the various sources of domestic sewage. Describe the various methods of sewage treatment.

4. Describe the various quality parameters for characterising sewage. Mention the Indian standards for disposal of sewage into natural watercourses and on land.

5. Explain the Term of "Domestic Sewage". Explain the various means of disposal & treatment of Domestic Sewage.

6. Differentiate between the following:-

(a) B.O.D. and C.O.D.

(b) Volatile solids and fixed solids.

(c) Aerobic bacteria and anaerobic bacteria.

(d) Denitrification and Nitrogen Fixation

7. Write a note on various physical properties of sewage.

8. What do you understand by the term “domestic sewage”. Explain various ways &

Means of disposal & treatment of domestic sewage?

9. Explain the role of an environmental engineer in respect of sewage management?

10. Determine ultimate BOD for a sewage having 5-day BOD at 20° C as 160 ppm . Assume the deoxygenating constant 0.2per day.

UNIT-2

1. Write a note on different types of sewer and the functions of each.

2. Describe, with neat sketches, various types of joints used in sewer lines.

3. Describe the various methods of collecting sewage and compare them. Describe the construction of sewer lines.

4. Discuss the various types of sewage pumping stations and challenges in maintenance of sewerage systems and disposal of sewerage in rivers.

5. (a) Enumerate various leading empirical formulas which are adopted for calculating the quantity of storm water.

(b)Distinguish between the separate system of sewerage and combined system of sewerage.

6. Write short notes on the following

(a) Intensity of rain fall

(b) Testing of Sewers

(c) Self cleansing velocity

(d) Siphon spill way & Inverted siphon

(e) Drop Manhole and Deep Manhole

7. Describe in brief merits demerits of the separate and combined system of sewage.

8. Write detailed note on maintenance of sewers.

9. Describe the procedure for laying and testing of sewer.

10. Write a note on selection of type and capacities of sewage pump.

UNIT-3

1. What do you understand by preliminary treatment of sewage? Enumerate various unit operations falling under this. Also, draw flow diagrams for the possible arrangements of various units falling under preliminary treatment.

2. (a) Write a note on racks and screens.

(b) Write a note on trickling filter.

3. Describe the various sewage treatment processes. Describe the oil and grease removal units.

4. Describe (i) septic tank (ii) sludge digestion (iii) trickling filter (iv) activated sludge process

5. Discuss the broad classification of the sewage treatment processes.

6. Describe the various types and cleaning devices of the grit chambers.

7. Differentiate the following:-

(a) Primary treatment and secondary treatment

(b) Course screens and fine screens.

(c) Grit chamber and detritus tank.

(d) Activated sludge process and Trickling filter.

8. Write short note on following:

(a) Aerated grit chamber

(b) Skimming tank

(c) Detritus tank

9. Explain, with the help of flow diagram, the essentials of activated sludge process.

10. Write a detailed note on ultrafiltration.

UNIT-4

1. Mention various methods of wastewater disposal. Discuss their merits and demerits. Explain the conditions favorable for their adoption.

2. What do you understand by self-purification property of a stream? Explain the factors affecting this property.

3. Discuss the technique of sewage disposal by dilution. What are its advantages and limitations? Explain self purification of streams.

4. Describe Irrigation sewage farming and waste water reuse.

5. What is meant by disposal of sewage by dilution? What are the conditions favorable for it? Mention the standards of dilution.

6. Explain the purposes of reuse of waste water. Also discuss the sewage disposal by Irrigation sewage farming.

7. What do you understand by “self purification of streams”?

8. Explain the process of waste water reuse & its advantages?

9. What is land treatment? Discuss the conditions under which it is suitable.

10. Write a note on the following:

(a) Dilation factor

(b) Sewage farming

UNIT-5

1. Discuss the various systems of plumbing. Sketch the S-type trap and show the water seal.

2. Draw a neat sketch of house drainage system. Also draw the site plan of the complete house.

3. Explain various systems of plumbing and sketch the plumbing by a two Pipe System.

4. Explain with neat sketch the layout of House drainage system.
5. Explain various systems of plumbing and sketch the plumbing by One Pipe System.
6. Write a detailed note on stack.

7. Write a detailed note on traps.

Subject: Hydraulic Structures (CE705)

UNIT 1 :

1.What are the points to be considered while selecting the site for a dam?Give the basis of the selection of most suitable type of dam under a particular situation.

2.Describe the main forces acting on a gravity dam.

3.What are the various criterion for checking the stability of a gravity dam?

4.Describe the various types of galleries in a gravity dam with their functions.Draw uplift pressure diagram with a drainage gallery in a dam with upstream and d/s water levels.

5. The following data is given for a concrete gravity dam:

Base width=96m; Total weight of dam=70150KN; Moment of weight about toe=3525000KN m.; Total Uplift force=16500KN; Moment of uplift force about toe=775000KNm; Horizontal water pressure on upstream face=35250KN; Moment of horizontal water pressure about toe=892300KNm; Coefficient of friction=0.75; Shear strength of concrete=1400Kn/sq.m.

Check the stability of this dam considering all stability criterion.

6.) Name and describe all the types of failure of earthen dams.

7.Define a phreatic line in earth dams.What are its characteristics and importance? Describe the method of drawing phreatic line with a horizontal blanket on the toe.

8.Differentiate between gravity dams and earthen dams giving advantages and disadvantages of each of the dams.

9.The following data is available for an earthen dam:

Top width =4m; R.L.of top of dam=120m; R.L.of dam base=106m; R.L.of F.R.L.=118m; Slope of U/S face=1V;2.5H; Slope of D/S face=1V:2H; Length of horizontal drainage filter from toe=28m; Coeff.of permeability of soil=0.008 cm/s.

Calculate the seepage discharge per meter length through dam body.

10. Name and describe the various methods adopted for the safe drainage of the seepage water through the earthen dams.

UNIT 2 :

1.What is the function of a spillway? What are the various locations where a spillway can be provided in a dam?

2.Name the various types of spillways with their sutability for various types of dams.

3. Describe the criterion for adopting the shape of an ogee spillway.

4. Write down the equation for designing the profile of ogee spillway.How is the discharge estimated over ogee spillway?

5. The design head over an ogee spillway is 12.5m corresponding to which the depth of water at toe is 2.2m.A hydraulic jump is desired to be formed at the toe for energy dissipation.The coefficient of discharge is 2.5. Calculate (i)the depth of flow after the jump (ii)Energy lost in the jump (iii)Length of apron required at the toe.

6. Draw various arrangements to be provided in a spillway with different tail water depths using hydraulic jump as energy dissipation device.

7. Calculate the discharge over an ogee spillway with coeff. Of discharge equal to 2.4 at a head of 2m.The length of spillway is is 100.The spillway crest is 8m above the bottom of the approach.Channel is having the same width as that of the spillway.

8 Describe various types of siphon spillways with neat sketches.

9. What are the advantages of a shaft spillway and where it it provided?Describe the function of this spillway with a neat sketch.

10. Describe an open channel spillway with a neat sketch.

UNIT 3

1.What are the main objectives of providing diversion headworks? What are the main points to be considered while selecting the most suitable site for a diversion headwork ?

2. Draw a neat diagram showing all the components of a diversion headwork.Describe briefly all the components.

3. What are the main differences between a weir and a barrage?

4. Name all the different types of weirs.Draw neat diagrams of all the types and write down the various components on the diagrams.

5. What are the causes of failure of a hydraulic structure due to subsurface flow.Explain these failures in details.

6. Explain Bligh's creep theory.How is the safety against piping and uplift pressure considered by this theory?

7. Following data is available for a weir site:

Design flood discharge=3600 cumecs; H.F.L.before weir construction=280m; Bed level of river=272m; allowable afflux=1.0m; retrogression=0.5m; Pond level=279.5m;Lacey's silt factor=1; Top width of weir= 3m; bottom width of weir= 8m; C=12

Estimate: Length of waterway;Discharge intensity q; Regime scour depth; Regime velocity; Depth of piles; U/S H.F.L.; Seepage head; Creep length; Lengths of impervious aprons.

8. Briefly explain the concept of Khosla's theory.

9. What are the differences between Bligh's and Khosla's theories?

10. What is exit gradient?Derive its formula.

A sheet pile of 5m depth is provided in a barrage having a seepage head of 7.5m.The value of safe exit gradient for the soil is 1/6.Find the length of impervious floor to be provided.

UNIT 4

1. What is a canal fall and what is its necessity?Explain the points to be considered while selecting the location for providing a canal fall.

2. Name the different types of falls generally provided in canals.What are the various design parameters to be considered for designing any type of fall?
3. Describe an ogee type fall with a neat diagram.What are its disadvantages?
4. What is a rapid fall?Where is it constructed in India?Why is this fall obsolete now?
5. Describe a vertical drop fall and explain the design parameters of this fall.
6. Describe different types of glacis falls with sketches.
7. Draw a neat diagram of Sarda fall and write all the components to be designed for this fall.
8. Design a Sarda fall for the following data:

   Discharge in canal=12 cumecs; Drop= 1.5m; U/S bed level=207.5m; D/S bed level= 206.0m;U/S F.S.L.=210m;D/S.F.S.L.=208.5m;U/S & D/S.bed width=11m.;Top width of crest=0.9m;Specific gravity of masonry=2.24. Assume any missing data suitably.
9. Write a note on various miscellaneous types of falls.
10. Estimate the thickness of the floor of the fall by Bligh's creep theory for the problem of Q.8.

CROSS DRAINAGE WORKS

UNIT 5 :

1. What are cross drainage works?What is its necessity?
2. Name the various types of cross drainage works.In what condition is each type most suitable?
3. What are the points to be considered while selecting the site for a cross drainage work?
4. Draw neat cross sections of an Aqueduct and a Siphon Aqueduct showing all the details and write down their various components.
5. What do you mean by the term,Fluming of Canal in cross drainage works? How is the fluming and fluming ratio selected?
6. What are canal transitions?Name and describe the various methods of designing canal transitions.
7. Describe the method of estimating uplift pressure on the floor and barrel roof of a siphon aqueduct.
8. How is the design of drainage waterway carried out for an aqueduct?
9. Differentiate between:

   (a) Aqueduct and Siphon Aqueduct (b) Superpassage and Siphon Superpassage

10 Design a siphon aqueduct for the following data:

Discharge of canal= 20cumecs; Bed width of canal= 18m; Depth of water= 1.5m; Bed level of canal=160m; High flood discharge=400 cumecs; High flood level of drainage= 160.5m; Bed level of drainage =158m; General ground level= 160m.

Subject: Concrete Structures-II (CE706)

UNIT-1

Q 1. (a) State the difference in load carrying mechanism in flexure under working condition between RCC and PSC.

(b) Define loss of prestress due to friction.

(c) State any two advantages of prestressed concrete members.

(d) Define loss of predtress due to elastic shortening of concrete.

Q 2. Write the possible losses in prestressing and develop the expression for elastic shortening.

Q 3. Write the methods of Prestressing and explain the Fressinet system.

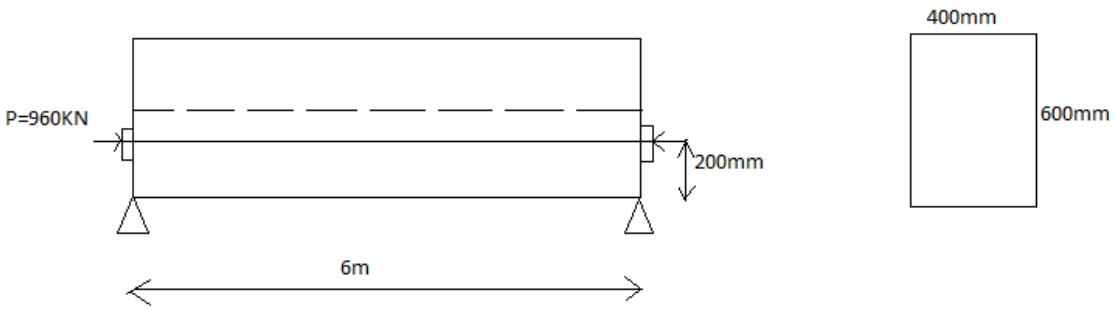
Q 4. State various losses in post tensioning and develop expression for friction and wobble effect.

Q 5. What is the concept of Prestress concrete? Also give the merits and demerits of prestressed concrete.

Q 6. Find the extreme fibre stresses by load balancing concept in a simply supported prestressed beam of rectangular section 400*600 mm. The beam is prestressed by a parabolic tendon with a prestressing force of 200KN. The tendon has a sag of 100mm at mid span and zero at the ends. The beam is subjected to total external UDL of 6KN/m over a simply supported span of 6m.

Q 7. A P.S.C. beam of 400*600mm and a span of 6m is subjected to u.d.l of 16KN/m including self weight of the beam. The tendons which are provided along the longitudional centoidal axis provide an effecting prestressing force of 960KN. Determine the extreme fibre stresses in concrete at the mid span section.

Q 8. Calculate the exetreme fibre stresses of the below given simply supported p.s.c beam which is subjected to uniformly distracted load 16KN/m including self weight of the beam using C-Line method.



Q 9. A post tension cable of beam 10m long is initially tension to a stress of 1000 N/mm^2 at one end. If the tendons are curved so that the slope is 1 in 24 at each end with a cross sectional area 600 mm^2.

Calculate:

a)Loss of prestress due to friction.

b)Initial value of pre stressing force.

c)Final value of prestressing force transferred to the concrete.

$\mu=0.3$, $k=0.0015/m$.

Q 10. Find the percentage loss in prestress due shrinkage and elastic shortening of concrete for a prestressed concrete beam of cross section 200*300mm and span=6m. The initial prestressing force of 400KN is applied at an eccentricity of 70mm by straight of 70mm by straight tendons of area 400mm^2.

Consider: $E_s=2*10^5 N/mm^2$, $E_c=33.3*10^3 N/mm^2$

Concrete shrinkage=0.002

UNIT-2

Q 1. A rectangular beam 450mm wide is subjected to the following at a section:

(i)Bending Moment of 50KN-m.

(ii)Shear force of 30KN and

(iii)Torsional moment of 25KN-m

Design the section and reinforcement. Use M20 grade of concrete and Fe 415 grade of steel.

Q 2. A curved beam is in form of continuous circle in plan with a radius of 4m and is simply supported on six supports. The beam carries a udl of 5KN/m length inclusive of its self weight. Determine Bending moment, twisting moment and shear force at salient locations and draw the variation over the span.

Q 3. Develop the expression for curved beam B.M , Torsion and shear force at any radial angle θ.

Q 4. Design a rectangular beam section of 300mm width and 500mm effective depth. Beam is subjected to moment M_u=60KN-m , Shear force V_u=50KN and Torsional moment of T_u=40KN-m. Consider concrete grade of M20 and steel grade Fe415.

Q 5. Design a rectangular beam of size 300mm width and 500mm effective depth subjected to following:

(i)M_u=175KNm

(ii)V_u=25KNm

(iii)T_u=10KNm

Consider concrete grade of M20 and steel grade Fe415.

Q 6. A rectangular beam 400mm wide is subjected to the following at a section

(i)B.M. of 45 KNm

(ii)Shear force of 30KN

(iii) Torsional moment of 20 KNm

Design the section and the torsional reinforcement. Take following permissible values σ_{st}=140 N/mm^2=σ_{sv}; σ_{cbc}=5N/mm^2

M=19 , f_y=250 N/mm^2; grade of concrete=M20.

Q 7. A curved beam is in the form of a full continuous circle in plan with a radius of 4m and is supported continuously on six supports. The beam carries a udl of 2 KN/m length, inclusive of its own weight. Determine the bending moment, twisting moment and shear force at salient location.

Q 8. A RCC beam of cross section 200*400mm is subjected to a bending moment and torsional moment equal to 10KN and 5KN respectively. Assuming the beam to be made to be made up of M30 grade concrete and Fe 415 steel grade HYSD bars. Determine the reinforcement required according to IS 456-2000 provisions. A transverse shear of 20 KN is also additionally present.

Q 9. Design a rectangular beam section of 300mm and 500mm effective depth using M20 and Fe415 with effective cover 35mm. The beam is subjected to factored moment = 50KNm, factored shear force=50KN and torsional moment=20KNm. Design as per IS 456:2000 provisions.

Q 10. A circular R.C girder of a water tank has a mean diameter of 10m. It is resting on 8 symmetrically placed columns and carries udl of 299.5 KN/m excluding self weight. The width of beam is 500mm and overall depth is 1000mm.

(a)Calculate the B.M , S.F and T.M at salient locations.

(b)Draw B.M.D , S.F.D and T.M.D.

(c) Design the beam using M20 and Fe 415.

UNIT-3

Q 1. Design a spherical dome over a circular tank for the following data:

Inside diameter of tank=14m

Rise of dome=4.5m

Live load due to wind, ice , snow , etc.=1.5 KN/m^2.

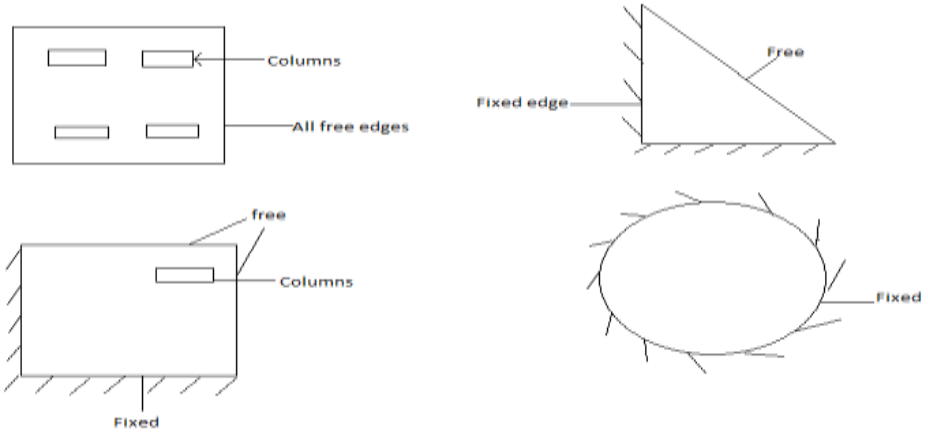
The dome has an opening of 1.7m diameter at its crown. A lantern is provided at its top , which causes a dead load of 24KN acting along the circumference of the opening.

Q 2. A conical dome span 10m and rise 2m has a shell which is 120mm thick, 2t carries a load of 10KN at its apex. The wind load is estimated as 1200N/$m^{2.}$ Examine the stresses in dome and design suitable reinforcement in dome.

Q 3. Develop the expression for meridoinal thrust in a circular dome.

Q 4. Develop an expression for collapse load of a simple supported square slab under yield line theory.

Q 5. Draw yield line diagram of following (fig.) slabs and state the assumption to draw yield line pattern.



Q6. What is characterstics of yield line theory? Also define the various patterns for slab in yield lines.

Q 7. Design a spherical dome over a circular room. The insider diameter of room is 12m. The rise of dome is 4m and live load due to wind; snow etc is 1.5 KN/m^2. The dome has an opening of 1.6m diameter at its crown. A lantern is provided at its top , which causes a dead load of 22 KN acting along the circumference of the opening.

Q 8. Design by yield line theory a simply supported square slab of 4m side length to support a service load of 4 KN/m^2. Adopt M20 grade concrete and Fe 415 steel grade. HYSD bars. Assume load factors as per IS: 456.

Q.9 Develop an expression for collapse load of a simply supported square slab under yield line theory.

Q.10 Develop an expression for load carrying capacity of a square slab simply supported on all the four edges, using yield line theory.

UNIT-4

Q 1. An open rectangular tank 4m×6m× 3m deep rests on firm ground. Design the tank. Use M 20 mix

Q.2 Design a circular tank with flexible base for capacity 400000 liters. The depth of water is to be 4 m, including a free board of 200 mm. Use M 20 concrete.

Q. 3 Write steps for design of an Intze tank component.

Q.4 Design a rectangular tank of size 6.5 m X 3.0 m and height 4.0 m resting on ground consider concrete M20 grade and steel Fe415 . Draw detailing of reinforcement.

Q.5 Design a rectangular water tank of size 5 m X 3 m X 3 m size. Tank is resting on ground. Consider M20 grade of concrete and steel Fe415.

Q.6 Explain the procedure for design of circular tank by appropriate method.

Q.7 Design a R.C.C circular tank Resting on ground with a flexible base and a spherical dome for storing 400,000 litres of water . the depth of storage is to be 4 m. Free board = 250 mm . Adopt M-20 grade concrete and Fe415 grade HYSD bars.

Q.8 Design a rectangular water tank of size 4 m X 6 m X 3 m (height). Consider concrete grade M20 and steel Fe415 . Tank is resting on the ground . Assume appropriate data and state clearly your assumptions.

Q. 9 Design a vertical wall of water tank of 400 kL capacity. The depth of water is limited to 4 m and free board of 300 mm. Use M30 concrete and Fe415 steel.

Q.10 Design the staging for a RCC Intze tank of 900 kilo litre capacity , supported over bottom ring beam of 10 m diameter. The height of staging is 16 m and has 8 columns. The weight of tank may be taken as 50% of weight of water . Assume a wind load of 150 KN acting on the container at a height of 6 from the bottom of lower ring beam. Neglecting the wind load on braces and columns, design the columns and braces. Using M20 grade of concrete and Fe415 grade of steel.

UNIT-5

Q. 1 Design a culvert across national highway for two lane carriage way width.

Consider the following data:-

Clear span (L_c) = 5.8 m

Support width = 400 mm

Calculate maximum B.M. in case of N.H. at culvert for:-

(i) Class AA- tracked loading

Draw details of reinforcement in plan. Take M 25 and Fe-415.

σ_{cbc} = 8.5 N/mm^2 σ_{cbc} = 230 N/mm^2

Q.2 Design a T-shaped cantilever retaining wall to retain earth embankment 3 m high above ground level. The unit weight of earth is 18 kN/m^3 and its angle of repose is 30^0. The embankment is horizontal at its top. The safe bearing capacity of soil may be taken as 100 kN/m^2 and the coefficient of friction between soil and concrete as 0.5. Use M 20 mix and Fe 415 bars.

Q.3 Design a slab for culvert for a clear span of 6 m having a clear road way of 7.5 m for a single vehicle of IRC class AA track vehicle loading only. Wearing coat 80 mm, Footpath on either side 1 m. Width of bearing is 0.4 m Use M25 and Fe415.

Q.4 Explain various stability checks required in design of retaining wall.

Q.5 Explain the following terms:

(a) Load balancing concept

(b) Post and pre-tensioning

(c) Buttress type retaining wall

(d) Box culvert bridge.

Q.6 Design top slab of a culvert for a span of 4 m for IRC class A loading . The carriage way is 5.5 m. Use M25 concrete and Fe415 steel.

Q.7 What is the structural difference between a cantilever and a counterfort retaining wall?

Q.8 Design a RCC deck slab culvert for following data :

Clear span = 5.8 m	Kerb width = 225 mm
Carriage way = 7.5 m	Width of piers = 560 mm
Wearing coat = 75 mm	Footpath = No
Concrete = M 25	Steel = Fe 415

Q.9 What is the criteria for economical span length in bridges?

Q.10 Design a deck slab (440 mm thick) of a single span bridge for the following data (use M 25 concrete and fe 415 steel)

Clear span : 5.5 m

Width of footpath on either side = 1 m

Support width at both side ends = 500 mm

Wearing coat = 100 mm

Loading = IRC class AA (Tracked)

Carriage way = 7.5 m

Also draw the detailing of reinforcement.