

Dadi Institute of Engineering & Technology
N.H-5, Anakapalle
DEPARTMENT OF CIVIL ENGINEERING
TEACHING PLAN

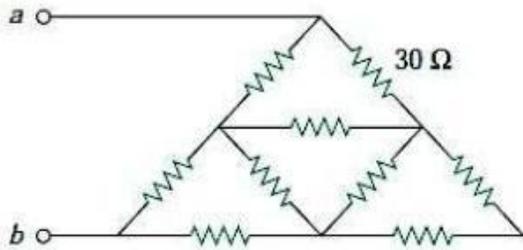
II B. Tech I Semester

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

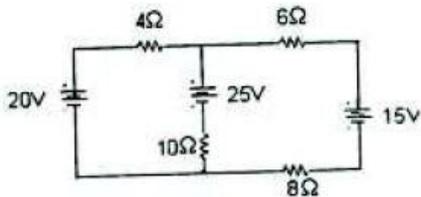
CIVIL , M.Rajendra Prasad, Asst Prof, EEE DEPT

Unit-I

1. a) State and explain Kirchoffs' laws?
- b) Find the equivalent resistance R_{ab} for the circuit shown below. All the resistor values are 30 ohms

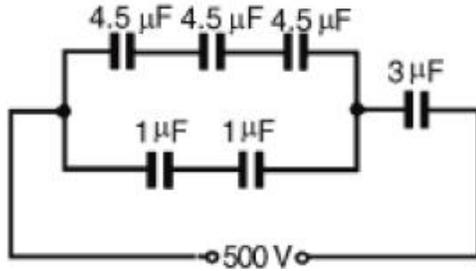


- 2.a) Define terms the inductance and capacitance
- b.) By applying Kirchoff's law, find the current through all the elements in the circuit as shown in the Figure



- 3a.) a) Explain Star-delta transformation?

- b) For the arrangement shown in Figure find (i) the equivalent circuit capacitance and (ii) the voltage across a $4.5 \mu\text{F}$ capacitor.



4.

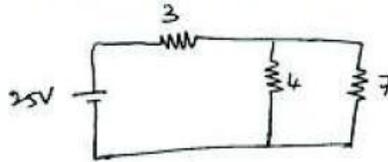
a) A coil takes 4 amperes when connected to 24 A dc supply. If this coil is connected to 40 V, 50 Hz AC supply then same amount of power is consumed. Calculate inductance of the coil and phase angle between voltage and current.

b) Three resistances 2 ohms, 4 ohms and 6 ohms are connected in series across 24V supply. Find the voltages across three resistors and current through each resistor.

a) Define the following terms

(i) Electric field, (ii) electric current and (iii) potential

b) For the circuit as shown in following figure 1, Calculate the current in the various branches and the power delivered and consumed? (All resistances are in ohms)



5.

6.a.) Distinguish between ideal and practical current source? Give examples?

b) Define electrical energy and specify its units?

c) A current of 5 A flows in a resistor of resistance 8 ohms. Determine the rate of heat dissipation and also the heat dissipated in 10 minute?

Unit 2

1. a) Explain the working of three point starter with the help of a neat sketch?

b) Briefly explain the procedure to conduct Swinburne's test on a DC machine?

2a.) a) Derive the torque equation of the DC motor?

b) An 8-pole, wave-connected armature has 600 conductors and is driven at 625 rev/min. If the flux per pole is 20 mWb, determine the generated e.m.f.

3 a) Briefly explain the working of a D.C. Generator.

b) A 400V D.C. shunt motor takes a current of 4.5A on no-load and 58.2A on full-load. Armature reaction weakens the field by 3%. Calculate the ratio of full-load speed to no-load speed. Given $R_a = 0.2\Omega$, brush voltage drop is 4V, $R_F = 150\Omega$.

4.

- a) Explain various methods of speed control of DC Motor?
- b) The armature of a DC machine has a resistance of 0.5Ω and is connected to a 200 V supply. Calculate the e.m.f. generated when it is running (i) as a motor taking 50 A and (ii) as a generator giving 70 A

5.

- a) Draw the neat sketch of a 3-point starter and explain
- b) Calculate the generated e.m.f of a 4-pole, wave-wound armature having 38 slots with 18 conductors per slot when driven at 1000 rpm. The flux / pole is 0.018 wb.

6.

- a) Explain the working of d.c. motor with neat diagram.
- b) A 4 pole wave wound dc generator is having 50 slots with 20 conductors per slot and rotating at 1500 rpm. The flux per pole is 0.018 wb, calculate the emf generated

Unit 3

1.

- a) Derive EMF equation of a single phase transformer?
- b) A single phase 15 KVA transformer has iron losses of 200W and full-load copper losses 300W. Determine the efficiency of a transformer at i) full-load, UPF ii) $\frac{3}{4}$ full load, UPF iii) half – load, 0.8 PF.

2.

- a) Explain construction and working of a Single phase transformer?
- b) A 4500 V/225 V, 50 Hz single-phase transformer is to have an approximate e.m.f. per turn of 15 V and operate with a maximum flux of 1.4 T. Calculate (i) the number of primary and secondary turns and (ii) the cross-sectional area of the core.

3. a) What are the losses that are occur in a transformer? Explain the methods to minimize losses.

b) The full load copper and iron losses of a 15 kVA, 1-phase transformer are 322 W and 200 W respectively. Calculate the efficiency on full load and half load when the load p.f is 0.8 lagging in each case?

- 4 a) Explain the transformer on no-load with phasor diagram.
b) A single phase core type 50Hz transformer has a square having 25cm side, the maximum flux density in the core 1.2 wb/m^2 . Calculate the number of turns per limb on H.V. side and L.V side for a 3400V/240V ratio.

5 .a) Explain transformer on load with phasor diagram.

b) A single phase 50Hz, 40kVA transformer has an iron loss of 450W and full load copper loss of 900W. Find the load at which maximum efficiency is achieved at unity power factor

6. a) Explain O.C and S.C test of a transformer?

b.) Define the regulation of transformer

unit 4:

1. a) Explain the concept of rotating magnetic field

b.) Give the comparison of induction motors with synchronous motors

2.

a) Describe predetermination of regulation of an alternator from the O.C and S.C tests

b) A 6-pole, 50 Hz, squirrel cage induction motor runs on no load at 975rpm. Calculate the percentage slip and frequency of the rotor current

a) How e.m.f. is induced in the armature of an alternator. What are the factors that cause the change of the alternator terminal voltage?

b) A 10-pole, 3-phase induction motor runs at a speed of 485 rpm at 50 Hz supply.

3. Determine i) synchronous speed ii) slip

4. a) Explain the procedure to find the regulation of three phase alternator by using synchronous impedance method?

b) Draw and explain slip-torque characteristics of an induction motor.

5 a) Draw and explain the torque-slip characteristics of three-phase induction motor

b) A 3-phase star connected alternator has 8-poles and runs at 750rpm. It has 24 slots/phase and 10 conductors per slot, the flux being 0.055 Wb/pole . Calculate the line voltage. Assume winding factor to be 0.96.

6. a) Derive the relation between stator supply frequency and rotor induced e.m.f frequency.
b) A 3-phase, 2-pole 50 Hz induction motor has a slip of 4% at no-load and 6% at full load. Find: i) Synchronous speed ii) Full-load speed iii) No-load speed iv) Frequency of rotor current at stand still v) Frequency of rotor current at full load.

Unit5:

1. Explain briefly the action of a p-n junction diode:

- (a) on open-circuit,
- (b) when provided with a forward bias and
- (c) when provided with a reverse bias. Sketch the characteristic curves for both forward and reverse bias conditions.

2. a) With a neat sketch explain operation of a PN junction diode? Draw its V-I characteristics
b) Discuss about the advantages and disadvantages of a half wave rectifier. Draw the output wave forms?

3. a) Draw the equivalent circuit of practical OP - Amp and state its characteristics
b) Explain the op-amp integrator and differentiator circuits and derive the expressions for output voltage?

4. a) Explain the following applications of OP-AMPs
(i) Inverting (ii) non inverting (iii) integrator and (iv) differentiator

b) Draw the circuit diagram of half wave rectifier and explain its operation.

5. a) Explain the rectifying action of the P-N junction diode with circuit diagram and wave forms

b) Describe the non- inverting Op-Amplifier with circuit diagram and derive necessary expressions.

6.a) Draw the circuit diagram of full wave rectifier having two diodes and explain its operation.

b.) With reference to an OP-AMP explain the parameters input bias current, input offset current and input offset voltage

unit 6:

1.a.) What are the characteristics of feedback amplifier.

b) Draw the frequency response of CE amplifier and explain.

2. a) Explain in detail about the differences between PNP and NPN transistors?

b) Draw and explain the input and output characteristics for transistor CE configuration?

3. a) Explain about the operation of a transistor as amplifier with a neat of circuit diagram?
b) Draw and explain the circuit diagram of a common emitter amplifier and draw its characteristics?

4.

- a) What is the transistor biasing? Explain
b) A transistor having $\alpha = 0.96$ is placed in common based configuration with load resistance of $5\text{k}\Omega$ if the emitter to base junction resistance is $80\ \Omega$, find the values of amplifier current voltage and power gain

5.

- a) Compare the characteristics of transistor amplifier in the three configurations?
b) Derive the relation between α , β , γ

6.

- a) Explain the V-I characteristics of common emitter configuration
b) Describe the concept of feedback amplifier.

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QUESTION BANK

NAME OF THE SUBJECT : BUILDING MATERIAL AND CONSTRUCTION

REGULATION : R16

COURSE : B.TECH

BRANCH : CIVIL

YEAR / SEMESTER : IIND YEAR – IST SEM

FACULTY : MRVSG GUPTHA

FACULTY

H.O.D,CIVIL

PRINCIPAL

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QUESTION BANK

UNIT- I

- 1.Explain about the classification of stones?
2. Discuss about quarrying of stones? Methods in quarrying? Precautions to be taken in blasting?
3. write the manufacturing process about bricks? Discuss various tests on bricks?
- 4.What are the characteristics of good tiles? Explain the manufacturing process of tiles?
- 5.what are the properties of good building stones?
- 6.What are the good qualities of brick? Enumerate the testes on brick as per IS code?
- 7.Define the terms:-
 - i) Frog
 - ii) King closer
 - iii) Header
 - iv) Queen closer.

UNIT- II

- 1.Draw a neat sketches of English and Flemish bonds? Discuss about cavity and partition walls?
- 2.define timber? in detail discuss about seasoning of timber? various components in timber?
- 3.classify the various types of wood used in building construction?
- 4.explain about the properties of steel, aluminium, galvanized iron.
- 5.what are the various defects in timber?
- 6.Compare English bond with Flemish bond.
- 7.Write the principles to be adopted while construction of brick masonry.

UNIT- III

- 1.Explain about classification of lime? and various methods involved in manufacture of lime.
- 2.discuss about Portland cement? write its chemical composition?
- 3.explain about hydration ,setting and fineness of cement.?
4. What are the good qualities of cement? Enumerate the testes on cement as per IS code?
- 5.What are the uses of mortar and concrete? Explain about various tests on concrete?
6. Explain crushing test and impact test of concrete.

UNIT- IV

1. What are the functions of Arches and lintels? Give relative merits and demerits of lintels over arches.
2. Write short note on
 - i) Relieving Arch
 - ii) Construction of arch
3. What are the various types of arches, Explain any one.
4. Explain the following items in case of stair cases. 1) Balustrade 2) Handrail 3) Soffit 4) Pitch

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QUESTION BANK

5. Describe in brief the construction of R.C.C floor.
6. What are the advantages and disadvantages of pitched and flat roofs?
7. Enumerate good requirement of roofs.
8. Draw neat sketch of King post truss.
9. Describe with neat sketch Queen post roof truss.

UNIT- V

1. Write short note on following (any Two)
 - i) Bay window
 - ii) Clear story window
 - iii) Sky-light.
 - iv) Dormer and gable window.
2. What is the necessity of plastering? What are the specification of Plastering in wall construction.
3. Write short note on :
 - i) Stucco plastering
 - ii) Defects in plastering work
4. Enumerate the defects in plastering and suggest suitable remedial measures
5. What is the object of pointing. Describe the operation of pointing regarding the preparation of surface and its application completely.
6. Discuss the requirement of good paint.
7. What are the defects in painting? Suggest suitable remedial measures.
8. What do you understand by the term 'Scaffolding'? With a neat sketch
9. What do you understand by the term 'Under prinning' and shoring?

UNIT- VI

1. Discuss about classification of aggregates depending on various parameters?
2. explain about the shape and texture of aggregates.
3. Write about bulking of sand.
4. What are the various tests to be performed on aggregate explain about them?
5. Explain about the qualities of a good aggregate?
6. Explain how you determine moisture content of aggregate.
7. Briefly explain how the specific gravity of aggregates is carried out.

Signature of the Faculty

Signature of the HOD

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FLUID MECHANICS

QUESTION BANK

Faculty: P.UMA

YEAR/SEM: II B.TECH -ISEM

UNIT-1

- (a) What are the different types fluids? Explain each type.
(b) State Pascal's law and give some examples where this principle is applied
- (a) What are the properties of ideal fluid?, What are the properties of real fluid?(7M)
(b) Explain the effect of temperature on viscosity. Explain atmospheric, gauge and vacuum pressures (2M)
- (a) One liter of crude oil weighs 9.6 N. Calculate its Specific weight, density and specific volume.
(b) Differentiate between simple and differential manometers
- (a) Define kinematic viscosity. What is the relation between kinematic and dynamic viscosity.
(b) Explain how the vacuum pressure can be measured with the help of U-tube manometer?
- (a) Explain all three Simple manometers with neat sketches.
(b) State the advantages of mechanical pressure gauges over manometers?
- Explain the differences between manometer and mechanical gauges. What are the different types of mechanical pressure gauges (7M)
(b) A metal ball weighs 9500N in air and 8000N in water. Find out its volume and specific gravity. (7M)
- Define the following fluid properties: Density, weight density, specific volume and specific gravity of a fluid. (7M)
(b) An oil film of thickness 1.5 mm is used for lubrication between a square plate of size 0.9 m × 0.9 m and an inclined plane having an angle of inclination 20°. The weight of the square plate is 392.4 N and it slides down the plane with a uniform velocity of 0.2 m/s. Find the dynamic viscosity of the oil
- Explain the term total pressure acting on a plane surface immersed in a fluid at any angle. Obtain an expression for this, and also for the corresponding depth of the centre of pressure (7M)

UNIT-2

- (a) Explain the terms total pressure and center of pressure
(b) What are the methods of describing fluid flow
- (a) Show that the centre of pressure of any lamina immersed under liquid is always below its centroid
(b) Define the equation of continuity. Obtain an expression for continuity equation for a 3D flow
- Derive an expression for the force exerted on a sub-merged vertical plane surface by the static liquid and locate the position of centre of pressure.
- Define and distinguish between (i) Steady and unsteady flow (ii) Rotational and irrotational flow. (iii) Uniform and nonuniform flow, (iv) Compressible and incompressible flow, (14M)
- Describe briefly with sketches the various methods used for measuring pressure exerted by fluids.
- Prove that the reaction between the gates of a locks is equal to the reaction at the hinge.
- Explain the terms: (i) Path line (ii) Streak line (iii) Stream line (iv) Stream tube. (7M)
- Define stream function and velocity potential. What are their uses? (7M)

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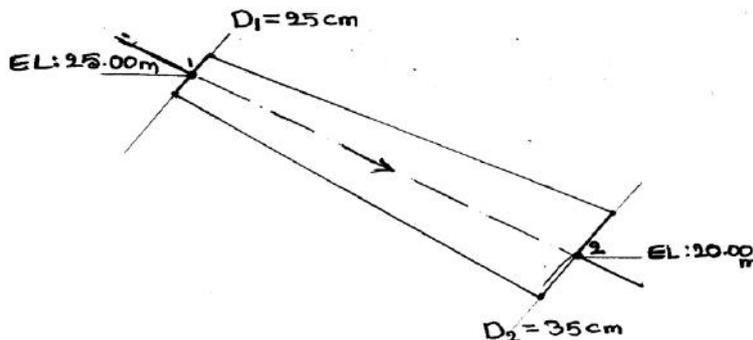
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- b) Determine whether the following velocity components satisfy the continuity equation. i) $u = cx$, $v = -cy$ ii) $u = -cx/y$, $v = c \log xy$ (7M)
8. The flow field is given by $y = x^3y$ Check whether the given field exists or not? Further check whether it is irrotational? (7M)
- b) Given that $u = x^2 - y^2$ and $v = -2xy$, determine the stream function and potential function for the flow

UNIT-3

- (a) Derive Bernoulli's theorem and state its limitations.
(b) What is momentum equation?
- Derive Euler's equation of motion for flow along a stream line. What are the assumptions involved.
- Derive Bernoulli's equation for the flow of an incompressible frictionless fluid from
Consideration of momentum
- A tapering pipe has a diameter of 25cm at point 1 (elevation 25.00m) and a diameter of 35cm at point 2 (elevation 20.00m) as shown in fig. If the pressure at point 1 is 120kPa, calculate the pressure at point 2 for a discharge of 0.20m³/s of water. The kinetic energy correction factors for sections 1 and 2 are 1.1 and 1.5 respectively. The loss of head through the pipe can be assumed to be $1.2(v_1 - v_2)^2/2g$. The flow is from section 1 to section 2.



- Gasoline which has a vapour pressure of 5.5×10^4 Pa (abs) and density = 680 kg/m^3 flows through a constriction in a pipe where the diameter is reduced from 20 cm to 10 cm. The pressure in the 20 cm pipe just upstream of the constriction is 50 kPa. If the atmospheric pressure is 75 cm of mercury, calculate the maximum discharge that can be passed through this constriction without cavitations occurring. Take $D_1 = 20 \text{ CM}$, $D_2 = 10 \text{ CM}$.
- A 30 cm diameter horizontal pipe terminates in a nozzle with the exit diameter of 7.5 cm. If the water flows through the pipe at the rate of $0.15 \text{ m}^3/\text{s}$. What force will be exerted by the fluid on the nozzle
- What are the applications of Momentum equation? Explain. (7M)
b) Describe the procedure of finding the forces on pipe bend. (7M)
- A pipe through which water is flowing, is having diameters, 20 cm and 10 cm at the cross-sections 1 and 2 respectively. The velocity of water at section 1 is given as 4 m/s. Find the velocity head at sections 1 and 2 and also rate of discharge (7M)

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- (b). A pipe, through which water is flowing, is having diameters 40 cm and 20 cm at the cross-sections 1 and 2 respectively. The velocity of water at section 1 is 5 m/s. Find the velocity head at the sections 1 and 2 and also rate of discharge. (7M)

UNIT-4

1. A crude oil of viscosity 0.97 poise and relative density is 0.9 is flowing through a horizontal circular pipe of diameter 10mm and a length of 10m calculate difference of pressure at two ends of the pipe if 100kg of oil is connected in a tank in 30 seconds.
2. Derive the expression for laminar air flow of liquid between the two parallel plates.
3. Sketch the velocity distribution and shear stress distribution for a laminar flow between parallel plates when one plate moving and other at rest.(3M)
3. a) Write about Reynolds experiment.
b) Derive an expression for compound pipe.
4. Derive the Darcy weishbach equation loss of head due to friction
5. a) What are the different losses while flowing fluid?
b) Derive an expression for pipes connected in parallel.
6. The rate of flow of water pumped into a pipe ABC, which is 200m long, is 20litres/s. The pipe is laid on the upward slope of 1 in 40. The length of the portion AB is 100m and its diameter is 100mm, while the length of the portion BC is also 100m but its diameter is 200 mm. The change of diameter at B is sudden. The flow is taking place from A to C , where the pressure is at A is 19.62 N/cm^2 and the end C is connected to a tank. Find the pressure at C and draw the hydraulic gradient and total energy line. Take $f=0.008$
7. Two reservoirs whose water surface elevation differing by 10 m are connected by a compound pipe are 300m to 300mm diameter and 150m to 200mm diameter and 240 m to 250mm diameter find the discharge through the pipe plot the HGL given friction factors 0.005,0.0055,0.0053. Take $C_C= 0.62$
8. What are the different losses in flow through the circular pipes (7M)
(b.)Define minor losses in pipes and obtain equation for any four losses. (7M)
9. Explain how the following flow problems are analyzed. i) Series pipe connection (ii) parallel pipe connection and iii) Equivalent pipe connection. (7M)
b) Explain how Reynold's experiment is conducted in the lab and bring its practical uses. (7M)
10. Define 'Hydraulic gradient line' and 'Total energy line'. The cross section of a pipe carrying a given discharge is suddenly enlarged. What would be the ratio of the two diameters of the pipe if the magnitude of the loss of head at this change of section is same irrespective of the direction of flow? Assume $CC = 0.64$.
b) Derive an expression for the loss of head due to friction in flow through circular pipes. (7M)
11. Explain with neat sketch the Reynold's experiment and define Laminar and Turbulent flow. (7M)
b) A compound piping system consists of a 1600m of 0.4m diameter, 1200m of 0.3m diameter and 800m pipe of 0.25m diameter cast iron pipes connected in series. Convert the system to (i) an equivalent length of 0.4m pipe and (ii) an equivalent size pipe 3000m long. (7M)

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UNIT -5

1. What are the applications of Venturimeter? Explain the working principle of venturimeter. (7M)
(b) What are the different types of notches? Explain Rectangular and Stepped notches (7M)
2. Derive an expression for venturimeter.
3. Derive an expression for orifice meter.
4. a) Define orifice and mouth piece and classify the different types of orifice.
b) Define coefficient of discharge C_d , C_v C_c . and write the relation between these three
5. a) Derive an expression for discharge through large orifice.
b) Derive the formula for discharge over a rectangular notch.
6. a) Derive the formula for discharge over a triangular notch.
b) Derive the expression for broad crested weir.
7. Find the discharge of water flowing through a pipe of 30 cm diameter placed in an inclined position where the venturimeter is inserted having a throat diameter 15cm. the difference of pressure between main and throat is measured by liquid of specific gravity of 0.6 in an inverted U-tube which gives a reading of 30cm. the loss of head between main and throat is 0.2 times the kinetic head of the pipe.
8. a) A Convergent divergent mouth piece having a throat diameter of 4cm is discharging water under a constant head of 2.0m. Determine maximum outer diameter for maximum discharge, find the maximum discharge also take $H_a=10.3$ m of water and H at convergent is 2.5 m of water.
b) Find the discharge through a trapezoidal notch which is 1m wide at top and 0.4m at bottom and is 30 cm height. The height of water on the notch is (head) 20cm. Assume C_d for rectangle portion is 0.62 and triangle portion is 0.6.
9. A Pitot tube was used to measure the quantity of water flowing in a pipe of 0.30m diameter. The water was raised to a height of 0.25m above the centre line of pipe in the vertical limb of the tube. If the mean velocity is 0.78 times the velocity at the centre and coefficient of Pitot tube is 0.98, find the discharge in the pipe line. The static pressure head at the centre of the pipe is 0.2 m. (7M)
b) A Venturi-meter is provided to measure the water flowing through a horizontal pipe of 25 cm diameter. The throat of the venturi-meter is 12cm. The pressure of water flowing through the pipe is 1.5 bar and the vacuum measured at the throat is 30 cm of Hg. Find the water flow rate through the pipe. Take $C_d=0.975$. (7M)
10. Differentiate between stagnation pressure head and static pressure head with reference to a pitot tube. Explain with the help of a neat sketch. (7M)
b) A Venturimeter of throat diameter 5cm is fitted into a 12.5 cm diameter water pipe line. The coefficient of discharge is 0.96. Calculate the flow in the pipe line when the reading on a mercury water differential U tube manometer connected to the upstream and throat sections shows a reading of 20 cm. (7M)
11. A Venturimeter has its axis vertical, the inlet and throat diameters being 150mm and 80 mm respectively. The throat has 220mm about inlet and coefficient discharge is 0.96. Petrol of specific gravity 0.78 flows up through the meter at a rate of 0.029 m³/s. Find the pressure difference between the inlet and the throat.
b) A 150mm X 75mm Venturi meter with a coefficient of discharge 0.98 is to be replaced by an orifice meter having a coefficient of discharge 0.60. If the both the meters are to give the same differential

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mercury manometer reading for a discharge of 100 liters per second and the inlet diameter is to remain 150mm. what should be diameter of the orifice? (7M)

UNIT -6

1. What is a boundary layer? Differentiate between a laminar and turbulent boundary layer. (7M)
 - b) Explain Boundary layer separation with a neat sketch. What are the conditions under which separation takes place? (7M)
2. a) Define boundary layer and give its significance
b) Calculate the friction drag on a flat plate 15cm wide and 45 cm long placed longitudinally in a stream of oil of relative density 0.925 and kinematic viscosity 0.9stoke, flowing with a free stream velocity of 6.0m/s also find the thickness of the boundary layer and shear stress at the trailing edge.
3. a) write about separation of boundary layer?
b) Air is flowing over a smooth plate with a velocity of 10m/s. The length of the plate is 1.2m and width 0.8m. If the laminar boundary layer exists upto a value of $Re = 2 \times 10^5$, find the maximum Distance from the leading edge upto which laminar boundary layer exists. Find the maximum thickness of laminar boundary layer if the velocity profile is given by Take kinematic viscosity for air = 0.15 stokes.
4. A smooth flat plate 2.0m wide and 2.5 m long towed in oil (RD=0.8) at a velocity of 1.5m/s along its length. Find the thickness of the boundary layer and shear stress at a) centre b) the trailing edge of the plate. Also find the power required for the towing the plate (kinematic viscosity $\nu_{oil} = 10^{-4} \text{ m}^2/\text{s}$).
5. Air is flowing over a flat plate 500 mm long and 600mm wide with a velocity of 4 m/s. The kinematic viscosity of air is given as $0.15 \times 10^{-4} \text{ m}^2/\text{s}$. Find a) the boundary layer thickness at the end of the plate. B) shear stress at 200mm from the leading edge and c) drag force on one side of the plate. Take the velocity profile over the plate as and density of air 1.24 kg/m^3 .
6. Determine the thickness of the boundary layer at the trailing edge of smooth plate of length 4m and of width 1.5m when the plate is moving with a velocity of 4m/s in stationary air. Take kinematic viscosity of air as $1.5 \times 10^{-5} \text{ m}^2/\text{s}$. determine the total drag on one side of the plate assuming that a) the boundary layer is laminar over the entire length of the plate and b) the boundary layer is turbulent from the very beginning. Take density for the air = 1.226 kg/m^3 .
7. Find the thickness of the boundary layer and the shear stress 1.5 m from the leading edge of a plate. The plate is 2m long and 1.4 m wide and is placed in water which is moving with a velocity of 200mm per second. Find the total drag force on the plate if dynamic viscosity for water = 0.01 poise.
8. Determine the boundary layer thickness, shear stress, in terms of Reynold's number.
9. Derive Von Karman momentum integral equation. (7M)
 - b) Define energy thickness. Derive an expression for the energy thickness
10. Define physically and mathematically the concept of displacement, momentum and energy thickness of a boundary layer. (7M)
 - b) Water is flowing over a thin smooth plate of length 5m and width 2.7m at a velocity of 1.2 m/sec. If the boundary layer flow changes from laminar to turbulent at a Reynolds number 5×10^5 . Find: i) The distance from leading edge up to which boundary layer is laminar and ii) Thickness of the boundary layer at the transition point. (7M)

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QUESTION BANK

SUBJECT: Strength of Materials

SEM: II-I

FACULTY: P.LAVANYA (CIVIL DEPT)

UNIT-1

1. Derive the relation between

- (a) Modulus of elasticity (E) and modulus of rigidity (G)
- (b) Modulus of elasticity (E) and bulk modulus (K)
- (c) Hence show that $E = 9KN / (3K+G)$.

[10]

2. a) Define (i) Poisson's ratio and (ii) Volumetric strain [3]

ii. The Modulus of rigidity for a material is $0.51 \times 10^5 \text{ N/mm}^2$. A 10 mm diameter rod of the Material was subjected to an axial pull of 10 kN and the change in diameter was observed to be $3 \times 10^{-3} \text{ mm}$. Calculate Poisson's ratio and the modulus of elasticity.

3. Derive the expressions for total extension for tapered rectangular and circular cross-sectional rods subjected to tensile load P. [10]

4. a) Find an expression for the strain energy stored in a body when the load is applied gradually, suddenly.

b) An unknown weight falls through a height of 25mm on a collar rigidly attached to the lower end of a vertical bar 6m long and 850 mm^2 in section. If the maximum extension of the rod is to be 3 mm, what is the corresponding stress and magnitude of the unknown weight? Take $E = 2.0 \times 10^5 \text{ N/mm}^2$. [6+10]

5.a) For a material, Young's modulus is given as $1.4 \times 10^5 \text{ N/mm}^2$ and Poisson's ratio 0.29. Calculate the bulk modulus.

b) Prove that the maximum stress induced in a body due to suddenly applied load is twice the stress induced when the same load is applied gradually. [5+5]

6. A vertical round steel rod 3m long is securely held at its upper end. A weight can slide freely on the rod and its fall is arrested by a stop provided at the lower end of the rod. When the weight falls from a height of 2.5 cm above the stop, the maximum stress reached in the rod is estimated to be 1450 kgf/cm^2 . Determine the stress in the rod if the load had been applied gradually and also the maximum stress if the load had fallen from a height of 4.5, take $E = 2.0 \times 10^5 \text{ N/mm}^2$ [10]

7. A straight bar 60 cm long consists of three portions : the first 18 cm length is of 30 mm dia, the middle 26 cm length is of 20 mm dia. and the remaining 16 cm length is of 25 cm dia. if it is

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subjected to an axial pull of 100 kN find the total extension of the bar. Find also the stresses, strains and changes in length of different portions. Take $E = 200 \text{ GPa}$ [10]

8. A rectangular plate made of steel is 4 m long and 20 mm thick and is subjected to an axial tensile load of 40 kN. The width of the plate varies from 30 mm at one end to 80 mm at the other end. Find the elongation, if $E = 2 \times 10^5 \text{ N/mm}^2$. [10]

9. A steel tube 2.4 cm external diameter and 1.8 cm internal diameter encloses a copper rod 1.5 cm diameter to which it is rigidly joined at each end. If at a temperature of 100°C there is no longitudinal stresses, calculate the stresses in the rod and the tube when the temperature is raised to 200°C . $E_s = 210 \text{ kN/mm}^2$ and $E_c = 100 \text{ kN/mm}^2$. Coefficient of linear expansion for steel is $11 \times 10^{-6} / ^\circ\text{C}$ and for copper $18 \times 10^{-6} / ^\circ\text{C}$ [16]

UNIT -2

1(a). Describe the different kinds of beams and their end reactions [3]

(b) Define point of contra flexure, Shear force and bending moment [4]

(c) Draw the B.M diagram of a cantilever beam of span L , subjected to a couple M at the free end. [3]

(d) What is the convention for shear force and bending moment? Show with the help of Diagrams [4]

2. a) What do you mean by point of contra flexure? Is the point of contra flexure and point of inflexion different?

b) A simply supported beam of length 10m carries point loads of 5 kN and 6 kN at a distance of 2 m and 4 m from the left end. Draw the S.F. and B.M. diagrams for the beam. [3+7]

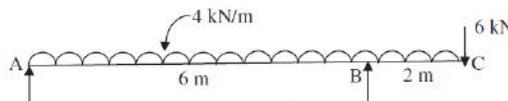
3. A simply supported beam of length 10m carries point loads of 4kN, 10kN and 7kN at a distance of 1.5m, 2.5m and 3m respectively from left end A. Draw the S.F. and B.M. diagrams for the simply supported beam [10]

4. A timber beam is freely supported on supports 6m apart. It carries a uniformly distributed load of 15 kN/m run and a point load of 10 kN at 4m from the right support. Design a suitable section of the beam making depth twice the width, if the stress in timber is not to exceed 9 N/mm^2 . [10]

6. Deduce the relation between bending moment, Shear force and intensity of loading. [10]

7. Draw the S.F.D. & B.M.D

[10]



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8. A simply supported beam of span 9 m loaded with a varying load of intensity zero at the left hand side and 3 kN/m at the right side. Draw the S.F and B.M diagrams. [12]

9. Draw the S.F and B.M diagrams of the beam shown in figure 1.

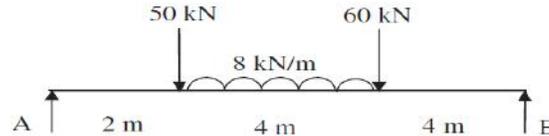
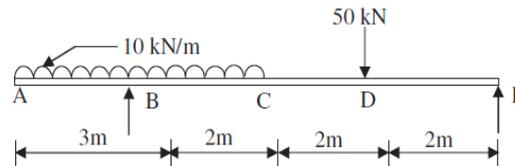


Figure 1

10. Draw Shear Force Diagram and Bending Moment diagram for the beam shown below



UNIT-3

1. (a) What do you mean by section modulus. Find the section modulus for a hollow circular section of external diameter, D and internal diameter, d , if internal diameter is 60% of external diameter

(b) Write the assumptions for theory of simple bending [6+4]

2. (a) Derive an expression for bending stress at a layer in a beam. [10]

(b) Derive the bending equation from fundamentals $M/I = f/y = E/R$

3. A timber cantilever 250mm wide and 350 mm deep is 3.5m long. It is loaded with a U.D.L. of 4 kN/m over the entire length. A point load of 3 kN is placed at the free end of the cantilever. Find the maximum bending stress produced. [10]

4. Define Neutral axis. Sketch the bending stress distribution across the cross section of a rectangular beam section 230×400 mm subjected to 60 KN-m moment. [10]

5. A timber beam of rectangular section is to support a load of 20 k N uniformly distributed over a span of 3.6 m when beam is simply supported. If the depth of section is to be twice the breadth, and the stress in the timber is not to exceed 7 N/mm², find the dimensions of the cross-section.

6.a) Deduce the section modulus for a hollow circular section of internal diameter, d and external diameter, D .

b) Deduce the section modulus for a hollow rectangular section of internal dimensions ($b \times h$) and external dimension ($B \times H$). [5+5]

7. Prove that the ratio of depth to width of the strongest beams that can be cut from a circular log of diameter, d is 1.414. [8]

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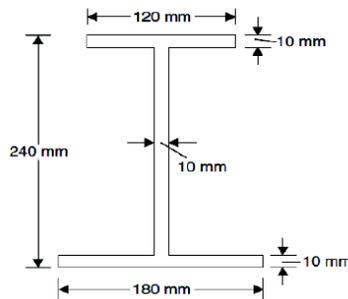
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8.a) State the assumptions made in deriving bending equation.

b) An I-section has the following dimensions: flanges 150×10 mm and overall depth = 260 mm, thickness of web 10 mm. It is used as a cantilever beam over a span of 3 m to carry a load of 40 kN/m over its entire span. Find the maximum bending stress induced. [6+10]

9. Unsymmetrical I-section shown in below Figure is used as a simply supported beam of 2.5m to carry a u.d.l of 5kN/m over entire span. Draw the bending stress across the depth marking the values at salient point. [16]



UNIT-4

1.(a) Define shear centre and demonstrate with an example

(b) Determine the shear center for a T-section

2.(a) Obtain the expression for shearing stress at a section of a loaded beam [4]

(b) Show that the ratio of maximum shear stress to average shear stress is 1.5 in case of a rectangular section (bxd). [6]

3. a) Prove that the maximum shear stress in a circular section of a beam is $\frac{4}{3}$ times the average shear stress.

b) A beam of square section is used as a beam with one diagonal horizontal. Find the magnitude and location of maximum shear stress in the beam. Also, sketch the shear stress distribution across the section.

4. A steel beam of I-section, 200mm deep and 160mm wide has 16mm thick flanges and 10mm thick web. The beam is subjected to a shear force of 250kN. Determine the shear stress distribution over the beam section if the web of the beam is kept horizontal. [10]

6. A beam is simply supported and carries a U.D.L of 40 kN/m run over the whole span. The section of the beam is rectangular having depth as 500 mm. If the maximum stress in the material

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of the beam is 120 N/mm^2 and moment of inertia of the section is $7 \times 10^8 \text{ mm}^4$. Find the span of the beam. [10]

7. Derive the shear stress distribution for rectangular and circular cross-section beams. [10]

8. The cross section of joist is a tee section $150 \text{ mm} \times 100 \text{ mm} \times 13 \text{ mm}$ with 150 mm side horizontal. Find the maximum intensity of shear stress and sketch the distribution of stress across the section, if it has to resist a shear force of 80 kN . [10]

9. A $120 \text{ mm} \times 50 \text{ mm}$ I-section is subjected to a shearing force of 10 kN . Calculate the shear stress at the neutral axis and at the top of the web. Given $I = 220 \times 10^4 \text{ mm}^4$, Area = $9.4 \times 10^2 \text{ mm}^2$, web thickness = 3.5 mm and flange thickness = 5.5 mm [10]

10. The T section of a beam has the following size:

Width of the flange 140 mm and depth of the flange 35 mm . Width of the web 30 mm and depth of the web is 130 mm . The beam is subjected to a vertical shear force of 60 kN . Calculate the shear stress at the junction of the web and the flange. [16]

UNIT-5

1.(a) State Mohr's theorems and their significance

(b). Explain moment area theorems with example. [4+4]

(c) A simply supported beam of span 2 m is loaded with a point load of 20 kN at its mid point. Find the maximum slope of the beam, if $EI = 500 \times 10^9 \text{ N-mm}^4$.

(d) A cantilever beam of span 2 m is loaded with a point load of 30 kN at its free end. Find the deflection at the free end, if $EI = 8 \times 10^{12} \text{ N-mm}^4$ [4+4]

2. A cantilever of length 4 m carries a uniformly distributed load of 24 kN/m length over the entire length. If moment of inertia of the beam = 10^8 mm^4 and value of $E = 2 \times 10^5 \text{ N/mm}^2$, determine the slope and deflection at the free end. [10]

3. A beam of length 12 m is simply supported at its ends and carries two point loads of 120 kN and 75 kN at a distance of 2 m and 5 m respectively from the left support. Calculate the deflections under each load. Find also the maximum deflection. Take $I = 18 \times 10^8 \text{ mm}^4$ and $E = 2 \times 10^5 \text{ N/mm}^2$. [10]

4. Determine the deflection at the free end of a cantilever which is 3 m long and carries a point load of 10 kN at the free end and a uniformly distributed load of 8 kN/m over a length of 1.5 m from the fixed end. Take $I = 2.25 \times 10^7 \text{ mm}^3$ and $E = 2.2 \times 10^5 \text{ N/mm}^2$. [10]

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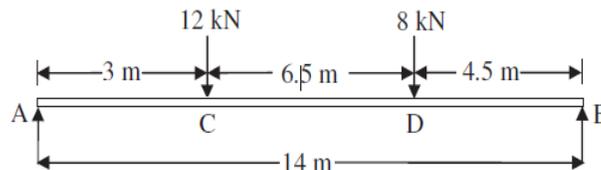
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5. A simply supported beam of span 5 m, carrying a point load of 5 kN at a distance of 3 m from the left end. Find (i) slope at the left support, (ii) deflection under the load and (iii) maximum deflection. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 1 \times 10^8 \text{ mm}^4$. Use double integration method. [10]
6. Find the slope and deflection of simply supported beam of span L, carrying i) a point load P at the centre, ii) a U.D.L of w kN/m over the entire span using the moment area method. [10]
7. A simply supported beam of span L, carrying a point load P at 0.4L from left support. Determine, the (i) mid-span deflection (ii) deflection under the load, and (iii) slopes at the supports. Use the method of integration. Assume constant flexural rigidity for the beam. [10]
8. A cantilever beam of span 7 m carries a point load of 15 kN at a distance of 4 m from the right end. Compute (a) the slope (b) the deflection under the load (c) the maximum deflection and its location. Take $E = 1.5 \times 10^5 \text{ N/mm}^2$ and $I = 5 \times 10^8 \text{ mm}^4$. [16]
9. A girder of uniform section and constant depth is freely supported over a span of 2.5 m. Calculate the central deflection and slopes at the ends of the beam under a central load of 22 kN. Given $I_{xx} = 8 \times 10^{-6} \text{ m}^4$ and $E = 190 \text{ GN/m}^2$ [16]
10. A horizontal steel girder having uniform cross-section is 14 m long and is simply supported at its ends. It carries two concentrated loads as shown in Figure 2. Calculate the deflections of the beam under the loads C and D. Take $E = 250 \text{ GPa}$ and $I = 150 \times 10^6 \text{ mm}^4$.



11. A overhang beam has two supports 4 a apart and has over hang portions of length a on either side of the supports. It is carrying a load of 4W at the center, and a load of W at its extremes. Determine the slope and deflection of the beam at the supports.

UNIT-6

- 1.(a) Deduce the longitudinal stress for a thin spherical shell subjected to an internal pressure of intensity 'p', with a thickness 't' and diameter 'd'. [4]
(b) Discuss the necessity and mechanics of compound cylinders [4]
(c) Derive the relation for volumetric strain and volume change for a thick spherical shell [4]

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2. Derive an expression for circumferential stress and longitudinal stress for a thin shell subjected to an internal pressure. [10]
3. A compound cylinder, formed by shrinking one tube on to another, is subjected to an internal pressure of 80N/mm^2 . Before the fluid is admitted the internal and external diameters of the compound cylinder are 120mm and 200 mm and the diameter at the junction is 160mm. If, after shrinking on, the radial pressure at the common surface is 10N/mm^2 , calculate the final stress set up by the section. [10]
4. A cylindrical shell 3 m long has 1 m internal diameter and 15 mm metal thickness. Calculate the circumferential and longitudinal stresses induced and also changes in the dimensions of the shell, if it is subjected to an internal pressure of 1.5N/mm^2 . Take $E = 200\text{ kN/mm}^2$ and Poisson's ratio = 0. [10]
5. A steel cylinder (thick) of 300 mm external diameter is to be shrunk to another steel cylinder of 150 mm internal diameter. After shrinking the diameter at the junction is 250 mm and radial pressure at the common junction is 28N/mm^2 . Find the original difference in radii at the junction. Take $E = 2 \times 10^5\text{N/mm}^2$. [10]
6. Derive the Lames equations from the fundamentals in a thick cylindrical shell for the given radii (r_1 and r_2) and internal fluid pressure, p . [10]
7. A cylindrical drum 400 mm in diameter has a thickness of 8mm. If the drum is subjected to an internal pressure of 2N/mm^2 , determine the increase in the volume of the drum. Take young's modulus of elasticity, $E = 1.6 \times 10^5\text{N/mm}^2$ and poisson's ratio 0.25.
8. A thick spherical shell of 350mm inside diameter is subjected to an internal pressure is 2N/mm^2 . Determine the necessary thickness of the shell, if the permissible stress in the shell material is 2.8N/mm^2
9. A pipe of 300 mm internal diameter and 60 mm thickness carries a fluid at a pressure of 15MN/m^2 . Calculate the maximum and minimum intensities of circumferential stresses across the section. Also sketch the radial stress distribution and circumferential stress distribution across the section.

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Department of Civil Engineering

QUESTION BANK

SUBJECT: Surveying

Year & SEM: IV B.Tech & I

FACULTY: Mr. B.Seshagiri Rao, Assistant Professor, Dept. of Civil Engineering

UNIT-1

1. Explain principal of Surveying. (5M)
2. Explain the principal of working from whole to part. (5M)
3. What do you mean by plane surveying? (5M)
4. List the instruments for Direct measurement of Distances? (3M)
5. Give the broad classification of Surveying? (5M)
6. List the reasons for incorrect length of chain? (3M)
7. Define surveying and state two purposes of surveying. (5M)
8. State the classifications of survey based on nature of field. (5M)
9. Define: a) Geodetic surveying b) Plane surveying (3M)
10. State two situations in which chain surveying is preferred. (5M)
11. A 20 m chain was found to be 15 cm too long after chaining a distance of 1600 m. It was found to be 30 cm too long at the end of day's work after chaining a total distance of 3200 m. Determine the correct distance if the chain was correct before the commencement of the work. (5M)

UNIT -II

1. Define Chain and Compass Traversing (3M)
2. Find the angles between the lines AB and AC, If their respective bearings are $35^{\circ} 40'$ and $142^{\circ} 20'$? (2M)
3. Differentiate between i) True meridian and Magnetic Meridian ii) Declination and Dip iii) Magnetic declination" and Azimuth. (5M)
4. In a triangle ABC, The bearings of the sides AB, BC, and CA are 60° , 130° and 270° respectively. Calculate the Interior angles A, B, and C in degrees? (5M)
5. Discuss the various obstacles in chaining. (5M)
6. What is ranging? What are the methods of ranging a survey line? (5M)
7. With neat sketch explain the uses of optical square. How the testing of it is done? (5M)
8. Explain the reciprocal ranging. (5M)
9. A Chain was tested and found exactly 30m before starting a survey. At the end of the chain survey, it was found to be 0.18 meter too long. The survey was for finding the area of a field. The area of this field as drawn to scale of 1cm = 50meters was 130 Sq-m. Find correct area of the field? (5M)
10. A 30m tape standardized in catenary as 29.990m at 100N is used in the field with a tension of 80 N in catenary. Calculate the Sag correction if the mass of the tape is 0.33 kg per m. (5M)
11. Explain clearly the difference between a prismatic compass and a surveyor's compass. (5M)

UNIT-III

1. What are temporary adjustments of dumpy level? How is it done? (5M)
2. List the fundamental lines of Dumpy Level? (5M)
3. Define the term "contour", "Contour Interval", "Horizontal Equivalent of Contour" (5M).
4. Describe the profile leveling method and method of Reciprocal leveling (5M)
5. Discuss the characteristics of contours, give suitable sketches. (5M)
6. Define the terms "Contour Interval" and "Horizontal Equivalent of Contour"? (5M)

7. The following consecutive reading were taken with a level and 4m leveling staff ground at common interval of 30m as 0.725 on A, 0.935, 2.845, 3.745, 3.935, 0.965, 1.135, 1.785, 2.625, 3.845, 0.965, 1.575 and 2.015 on B. The elevation of point A is 220.50m. Make up level book page, apply usual check and calculate the reduced levels of points. Also calculate the gradient of line AB. (5M)
8. Following consecutive staff reading were taken with a level along a sloping ground line AB at a regular distance of 20m by using 4 m leveling staff 0.352, 0.787, 1.832, 2.956, 3.758, 0.953, 1.766, 2.738, 3.872, 0.812, 2.325 and 3.137 Rule out a page of level field book, enter the above reading RL of point A is 320.288 Calculate RL of all point by rise fall system, and work out the gradient of line AB. (5M)

UNIT-IV

1. Draw a neat diagram of transit theodolite and label its parts. (5M)
2. List the method of traversing with theodolite? (5M)
3. Define the terms : i) Transiting ii) Swinging face left iii) Face Right (5M)
4. State the Principle of tachometric Surveying? (5M)
5. Describe the process of repetition and reiteration method of measurement of horizontal angle between two lines with theodolite. (5M)
6. Write short note on temporary adjustment of theodolite. (5M)
7. A theodolite was setup a distance of 180m from a light house and the angle of elevation to its top and depression to its base were observed as $22^{\circ}45'$ and $1^{\circ}12'$ respectively. The reading on a staff held on B.M. of R.L. 175.590m. was 1.85m with line of collimation horizontal. Calculate 1) The height of light house 2) The R.L. of top. (5M)
8. Explain the terms: 1) Latitude 2) Departure 3) Consecutive Coordinate 4) Independent Coordinate (5M)
9. Due to certain obstruction in running a traverse ABCDEA, the length and bearing of the line CD could not be taken. The following measurements were taken. Calculate the length and bearing of the line CD:- Line Length(m) Bearing
 AB 322.20 $33^{\circ}45'$ BC 300.00 $86^{\circ}24'$ CD ?? DE 450.00 $243^{\circ}54'$ EA 268.00 $317^{\circ}30'$ (5M)
10. Explain, how to determine R.L. of the Elevated object as base of the object inaccessible and instrument station are in the same vertical plane as that of the elevated object and also instrument axes at the same level in case of trigonometric leveling. (5M)
11. What are the different fundamental axes of theodolite and list out the relation between them? (5M)
12. Describe the process of repetition and reiteration method of Theodolite traversing. (5M)

UNIT-V

1. List the various methods of setting out a simple circular curves. Explain briefly the rankine method of deflection angles. (5M)
2. Explain the elements of simple curve Write short notes on Elements of a compound curve, Reverse Curve and "Compound Curve" (5M)
3. Explain the method of setting out curve by Chord and Angle method? (5M)
4. Classify the Curves? (5M)
5. Explain the terminologies of curves with neat sketch. (5M)
6. Two straights meet at an angle of 150° at chainage 35 + 12.8m. they are to be connected by a circular curve of radius 300m.
 Determine: a) Degree of curve b) Length of curve c) Apex distance d) Length of long chord. (5M)

UNIT-VI

1. The following offsets were taken from a chain line to a hedge Distance in meter 0 6 12 18 24 36 48 60 72 81 90 Offset in meter 3.6 3.0 2.4 1.8 1.2 1.5 2.1 2.4 3.0 3.3 3.9 Calculate the area enclosed between the chain line the hedge and the end offsets by a) Trapezoidal rule and b) Simpson's rule. (5M)
2. Write the formula for Simpson's rule? (5M)
3. Strata the various methods for computation of areas along irregular boundaries? (5M)
4. A railway embankment of formation width of 8m and side slope 2:1 is to be constructed. The ground level along the centre lines is as follows Chainage (m) Ground level (m) 0 115.75 50 114.35 100 116.80 150 115.20 200 118.50 250 118.25 The embankment has a rising gradient of a line 1 in 100 and the formation level at zero chainage is 115.00m. Assuming the ground as plane, compute the volume of earth work. (5M)
5. A road Embankment 500m long is 15 wide at the formation level and has a side slope 2:1, the ground level at every 100m along the centre line are as follows:- Distance (m) 0 100 200 300 400 500 Ground level (m) 105.2 106.5 107.6

107.2 108.3 108.8 The formation level at Zero Chainage is 107.0mt and the embankment has a rising gradient of 1 :100 while the ground is level across the centre line, Calculate the volume of earth work according to the prismatic rule. (5M)

4. Calculate the quantity of earthwork in cubic meters required for road embankment from the following data:- Formation width = 9 mt. Side slopes = 2:1 . Distance in mt. Height of bank in mt. Sode slope of the ground 0 30 60 3.0 3.6 3.7 1 in 10 1 in 8 1 in 12. (5M)
5. State the determination of capacity of reservoir? (5M)
6. List the methods of calculation for volume of barrow pits? (5M)