Q) Moment area method is a method for determining the ---------> **slope and deflection at a point**

Q) The shape of the bending moment diagram for a uniform cantilever beam carrying a uniformly distributed load over it length is ---------> **parabola**

Q) The degree of indeterminacy or redundancy is given by the number of --------to be determined.--> **redundant reactions**

Q) In moment area method, the deviation at any point on the elastic curve is positive if the point lies -----> **above the tangent**

Q) How many number of independent components of displacement for a joint in a space frame.--> **6**

Q) In a continuous beam, if the end supports are fixed supports then the slopes at fixed end will be ----------> **zero**

Q) How many number of degree of freedom for a plane truss joint.--> **2**

Q) How many number of translation degree of freedom for a plane frame joint?--> **2**

Q) The strain-displacement equations are used instead of the ----------equations for the displacement analysis--> **Compatibility**

Q) The change in slope between any two points on the elastic curve equals the area of the ----- between these two points.--> **M/EI diagram**

Q) The moment M_1, M_2, and M_3 be positive if they cause -------in the upper part of the beam.--> **compression**

Q) An elastic prop is one where---------> **the deflection is known**

Q) How many number of independent components of displacement for a joint in a plane frame--> **3**

Q) How many equations of compatibility which must be satisfied in the solution of plain strain problems in elasticity?--> **1**

Q) If there are only concentrated loads on the structure, the M/EI diagram consists of the ---shapes--> **triangular**

Q) A beam is simply supported at its ends and is loaded by a couple at its mid-span. The shear force is-----------> **constant value everywhere along its length**

Q) How many number of rotational constrained degree of freedom for a propped cantilever beam?--> **1**

Q) The equilibrium equations are valid for ----------------------> **All materials**

Q) When the static equilibrium equations are insufficient for determining the internal forces and reactions on that structure is called --------> **statically indeterminate**

Q) Three Moment Equation expresses the relation between bending moments at ----------successive supports of a continuous beam--> **3**

Q) If there are only linearly varying distributed loads on the structure, the moment diagram (M/EI) will results ----------> **cubic curves**

Q) In case in the frame there are more members that can be analysed by the statics, the frame is said to be ---------------> **internally redundant**

Q) The number of unconstrained independent displacements in a structure is called ----------> **kinematic indeterminacy**

Q) In moment area method, the deviation at any point on the elastic curve is ---- if the point is ---the tangent--> **negative, below**

Q) In case of statically determinate frames if any member is not of exact length and it is forced in position, there are ---------stresses induced in the members of the frame.--> **zero**

Q) In case the reaction components are more than those that can be found by equations of

statics, the frame is said to be ---------------->**externally redundant**

Q) Clapeyrons theorem is associated with the analysis of ------->**continuous beams**

Q) How many equations of equilibrium must be satisfied at all interior points in a deformable body under a three-dimensional force system-->**3**

Q) In moment area method, we measured it from left tangent, if θ is ----direction, the change in slope is positive.-->**counterclockwise**

Q) Statically indeterminacy is the existence of a -----solution to the homogeneous system of equilibrium equations.-->**non-trivial**

Q) In a continuous beam, if the end supports are simply supported the bending moment at end supports are----------->**zero**

Q) The resulting stress functions give stresses which satisfy the equations of equilibrium and ------at all points within and on the boundary of the body.-->**Compatibility**

Q) Which one of the following is represented by the area of the shear force diagram from one end upto a given location on the beam?-->**Bending moment at the location**

Q) In case the number of members is more or number of reaction components is more than minimum required, the frame becomes----------->**indeterminate**

Q) A simply supported beam of constant flexural rigidity and length 2L carries a concentrated load P at its mid-span and the deflection under the load is Y. If a cantilever beam of the same flexural rigidity and length L is subjected to load P at its free end, then the deflection at the free end will be---->**2Y**

Q) The kinematic indeterminacy of a planar structure with three supports (fixed-roller-roller) is ------------->**5**

Q) In moment area method, we measured it from left tangent, the change in slope is negative if θ is ----direction-->**clockwise**

Q) The number of independent elastic constants required to express the stress-strain relationship for a linearly elastic isotropic material is ----->**2**

Q) Singularity functions are a class of ------functions that contain singularities-->**singular**

Q) The statically indeterminate beams and frames can be analysed by ---------->**three moment equation**

Q) A continuous beam is one which is------------>**supported at more than two supports**

Q) If there are only uniformly distributed loads on the structure, the moment diagram (M/EI) will results ---------->**parabolic curves**

Q) A truss is statically determinate internally if the total number of members is ---, where j = number of joints-->**m = 2j - 3**

Q) For simply supported beam, when the concentrated load acts at the centre of beam. Then the maximum deflection for unit load is-->**1/48**

Q) A structure is usually externally --------if the reactions at the supports cannot be determined by using three equations of equilibrium.-->**redundant**

Q) Three-moment theorem was put forward by --------->**Clapeyron**

Q) At the points of contraflexure is ------------------->**the bending moment is zero**

Q) How many equations of strain compatibility which must be satisfied in the solution of three-dimensional problems in elasticity.-->**6**

Q) The bending moment will be positive if it ---------the curvature of the beam-->**increases**

Q) In case of curved beam, increase of curvature of the beam will ------the radius of curvature-->**decrease**

Q) To determine the stresses in a curved beam the following theory can be used.-->**Winkler-Bach**

Q) With reference to the curved beam theory which statement is true---->**radial stress is zero**

Q) The units of foundation modulus per unit beam width are ------>**N/m^2**

Q) The nature of stress at the inside surface of a crane hook is ---------->**tensile**

Q) The following beams in addition to equilibrium equations, the compatibility equations are also used to find out reaction forces are------>**Indeterminate beams**

Q) A simply supported beam carrying a concentrated load w at mid-span deflects by δ_1 under the load. If the same beam carries the load w such that it is distributed uniformly over the entire length undergoes a deflection δ_2 at the mid-span, the ratio $\delta_1 : \delta_2$ is ---------->**1.6 : 1**

Q) The flexural rigidity of the beam is --------->**EI**

Q) In case of curved beam, transverse sections which are plane before bending -----after bending.-->**remain plane**

Q) The bending moment will be negative if it ---------the curvature of the beam-->**decreases**

Q) The beam lies on elastic foundation when under the applied external loads, the reaction forces of the foundation are --------at every point to the deflection of the beam at this point.-->**proportional**

Q) The following assumption is made in the Winkler-Bach theory, the radial strain is------------->**Negligible**

Q) The deflection of a ring under compression when a small cut is made at the horizontal diameter shall------->**increase**

Q) The distance from neutral axis is positive if it is measured from the centroidal axis -------of beam.-->**towards the convex side**

Q) In case of curved beam of compact cross-section loaded normal to the plane of curvature, if the beam is fixed supports at both ends with point load w applied at mid-span then reaction force at right fixed end is -----, assume left fixed end reaction is v.-->**v-w**

Q) The modulus of the foundation units are --------->**kN/m^2/m**

Q) The curved beam theory was postulated by ------------>**Winkler-Bach**

Q) The nature of stress at the inside surface of a curved beam (concave shape D. is ----------->**tensile**

Q) The following assumption is made for curved beams in the Winkler-Bach theory, the material considered is --------------->**Isotropic**

Q) The maximum stress in ring under tension occurs------------>**along the line of the load**

Q) The distance from neutral axis is negative if it is measured from the centroidal axis -------of beam.-->**towards the concave side**

Q) In case of curved beam of compact cross-section loaded normal to the plane of curvature, if the beam is cantilever with point load w applied at mid-span and another load v applied at free end in opposite direction of w then reaction force at fixed end is ---->**v-w**

Q) In case of curved beam, stress concentration is ------at the inner fibers-->**higher**

Q) In case of curved beam of compact cross-section loaded normal to the plane of curvature, if the beam is cantilever with point load w applied at mid-span then reaction force at fixed end is -------->**w**

Q) The maximum stress in a closed ring when a small cut is made at the horizontal diameter will --------->**increase**

Q) In case of curved beam, the distance between any longitudinal fibre from centroidal axis is -------before and after bending-->**same**

Q) The bending stress at neutral axis for a beam is ------------------->**zero**

Q) Resultant stress in a curved beam subjected to direct stress (σ_0) and bending stress

(σ_B) is -------------------->$\sigma_0 + \sigma_b$

Q) The nature of stress at the outside surface of a concave shaped bulkhead is ----------->**compressive**

Q) In case of curved beam, neutral axis of the cross-section --------the centroid of the section.-->**does not passes through**

Q) The nature of stress at the inside surface of a concave shaped bulkhead is ----------->**tensile**

Q) If the radius of curvature is -------------times the depth of the beam, the beam is said to be having large initial curvature.-->**less than 5**

Q) The distribution of bending stress in curved bulkhead is ------------->**hyperbolic**

Q) In case of beams on elastic foundation, if k is constant of the supporting medium, E is the youngs modulus and I is the moment of inertia then characteristic of the system (λ)is ------------------>$(k/4EI)^{0.25}$

Q) In the case of curved beams the neutral axis ------------->**does not coincide with the geometric axis**

Q) Each layer of the curved beam is free to expand or contract, ----------of the layer, above and below it.-->**independently**

Q) If the radius of curvature is -------------times the depth of the beam, the beam is said to be having small initial curvature.-->**more than 5**

Q) The total force on the section of the beam for a pure bending is ------------>**zero**

Q) The cross-section of a crane hook is generally ------------->**trapezoidal**

Q) The distribution of bending stress in curved beams is -------------->**hyperbolic**

Q) The distribution of the stress in the case of curved beam is --------because of the neutral axis is initially curved.-->**non- linear**

Q) In a distributed reaction forces in the supporting medium, the intensity at any point is --------------to the deflection of the beam.-->**proportional**

Q) In case of curved beam, Stress concentration is ------at the outer fibers-->**lower**

Q) In the case of curved bulkhead in fuselage the neutral axis ------------->**does not coincide with the geometric axis**

Q) A column may be defined as a member of structures ----->**inclined at 90^0 to horizontal and carrying an axial compressive load**

Q) How many basic types of elastic foundations.-->**2**

Q) In case of curved beam, neutral axis always ---------the centre of curvature-->**shifts towards**

Q) The nature of stress at the outside surface of a convex shaped bulkhead is ----------->**compressive**

Q) In the case of Winkler type of foundation the pressure in the foundation is----->**proportional to the deflection**

Q) The elastic support is provided by a load-bearing medium, distributed continuously along the length of the beam is called --------------->**beams on elastic foundation**

Q) For which one of the following columns, Euler buckling load = 4 $\pi^2 EI/L^2$-->**column with both ends fixed**

Q) The effective length of a given column with given end conditions is the equivalent column of the same material and cross-section with ----------, and having the crippling load equal to that of the given column.-->**both hinged ends**

Q) Eulers critical load for a column of length L, moment of inertia I and modulus of elasticity E is given by------>$\pi^2 EI/L^2$

Q) The ratio of equivalent length of a column, having both ends hinged, to its length is ------->**1**

Q) Rankine formula for columns takes into account--------->**the effect of direct compressive stress**

Q) Radius of gyration for any cross section is ----------> **B. $\sqrt{(I/}$**

Q) Rankine-Gordon formula for buckling is valid for--> **short columns**

Q) Radius of gyration of rectangular section of depth d and breath b about an centroidal axis parallel to breadth is-------> **d/$\sqrt{12}$**

Q) If I = 80×10^2 cm^4 and area of cross section for column is 5 mm^2, then slenderness ration of column is ------> **40 cm**

Q) The material constant in the Rankine formula for cast iron is ----------> **1/1600**

Q) The buckling load for a column pinned at both ends is 10 kN. If the ends are fixed, the buckling load changes to-----> **40 kN**

Q) If slenderness ratio is 40 and E = 2.0×10^5 N/mm^2, the critical stress for strut is when both ends hinged --------------> **$\pi^2 \times 10^3/8$**

Q) Slenderness ratio of column may be defined as the ratio of its length to the----> **minimum radius of gyration**

Q) The ratio of equivalent length of a column, having one end fixed and other free, to its length is -------> **2**

Q) For a short column the slenderness ratio should be------> **less than 32**

Q) The ratio of equivalent length of a column, having one end fixed and other hinged, to its length is -------> **1/$\sqrt{2}$**

Q) Johnsons parabolic formula for column is----------------- Where P is critical load, σ_c is compressive yield stress, c is the constant, R is slenderness ratio and A is cross-sectional area of column.--> **P = σ_c A (1 - c R^2)**

Q) Eulers buckling formula is applicable for columns----------> **subjected to truly axial loads**

Q) When a column is subjected to loading along the axis, the point at which stability is changing to unstable condition is called-----------> **point of bifurcation**

Q) If the crippling load is 100 N and safe load is 25, the factor of safety---------> **4**

Q) A hollow C.I. column whose outside diameter is 200 mm has a thickness of 20 mm. The square of slenderness ratio is -----------------> **41 cm^2**

Q) If σ_b is the bending stress and σ_d is the direct stress for a compressive load with no buckling, the maximum compressive stress for the column section with eccentricity is ---------------> **$\sigma_b + \sigma_d$**

Q) A solid round bar 6 cm in diameter and 2 m long is used as a strut. One end of the strut is fixed while its other end is hinged. The Eulers load is -------, if E is Youngs modulus--> **E x π^2 x 10^{-8}/128**

Q) The secant formula is used for -----------> **long columns under eccentric loading**

Q) The material constant in the Rankine formula for wrought iron is ----------> **1/9000**

Q) A strut may be defined as a member of a structure----------> **in any position carrying a compressive load**

Q) If the moment of inertia about X-axis is greater than moment of inertia about Y-axis, then buckling will take place about -----axis--> **Y**

Q) If the end conditions of a column are changed from both ends hinged to both ends fixed the critical load shall------> **increase by 4 times**

Q) If long column under eccentric loading, the following formula can be used--> **Secant**

Q) If the end conditions of a column are changed from both ends hinged to one end hinged and other end fixed the critical load shall------> **increase by 2 times**

Q) The equation $1/P_c + 1/P_{cr} = 1/P$ is given by-----------> **Rankin**

Q) The slenderness ratio for a column hinged at both end is 125. If the length of the column is 500

mm, the radius of gyration is------------>**4**

Q) For a column to be long its slenderness ratio should be------>**more than 120**

Q) The ratio of equivalent length of a column, having both ends fixed, to its length is ------->**1/2**

Q) A beam column may be defined as a column--------->**carrying axial and transverse loads**

Q) The radius of gyration of a circular column of diameter d is--------->**d/4**

Q) The basic column theory is proposed by -------->**Euler**

Q) Eulers theory of buckling of columns is applicable for the shortening of the column due to ------------------>**axial compression is negligible**

Q) The material constant in the Rankine formula for alumium is ---------->**1/5000**

Q) The equivalent length is equal to actual length of column with ---------->**both ends hinged**

Q) If the end conditions of a column are changed from both ends hinged to both ends fixed the equivalent length shall be --------------of original length of column.-->**decrease by 2 times**

Q) A column shall always buckle about an axis about which----------. (where I is the moment of inertia and R is the radius of gyration)-->**I is minimum and R is minimum**

Q) If the end conditions of a column are changed from both ends hinged to one end fixed and other end free the critical load shall------>**decrease by 4 times**

Q) To avoid tension in short column the load must lie---------->**within the middle-third of the cross-section**

Q) A hollow column whose outside diameter is 200 mm and 20 mm thick. It is 4.5 m long and is fixed at both ends. The least radius gyration of column is ----->**64 mm**

Q) If the external force is less than the restoring force of a column, the column is--->**stable**

Q) Both end fixed column boundary conditions are-->**both deflection and slope are zero**

Q) If the end conditions of a column are changed from both ends hinged to one end hinged and other end free the critical load shall------>**decrease by 4 times**

Q) The material constant in the Rankine formula for mild steel is ---------->**1/7500**