Q.29 Draw stress strain curve for mild steel specimen subjected to compressive force.

Q.30 Draw shearing force diagram of simply supported beam

Q.31 Explain various assumptions made in theory of simple bending.

Q.32 Define M.O.I. Write the formula for M.O.I of a rectangle about horizontal & vertical axis passing through the centroid?

Q.33 What are different modes of failure of column?

Q.34 State any five assumptions made for theory of pure torsion.

Q.35 Define springs. Write any four functions of springs.

SECTION-D

Note: Long answer type questions. Attempt any two questions out of three questions.   (2x10=20)

Q.36 State and prove Lami's theorem.

Q.37 Explain single purchase winch crab with the help of neat sketch and drive an expression for its velocity ratio.

Q.38 A brass rod 2 cm diameter and 1.5 m long is subjected to an axial pull of 4 tonnes. Find the stress, strain and elongation of the bar, if modulus of elasticity for the brass is $1.0 \times 10^6 \, kg/cm^2$.

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Time : 3Hrs.   M.M. : 100

SECTION-A

Note: Multiple choice questions. All questions are compulsory   (10x1=10)

Q.1 What is the magnitude of a unit vector?
a) It has no magnitude b) zero
c) Constant but not zero d) Unity

Q.2 What does Newton's third law states?
a) The rate of change of momentum is equal to the force applied
b) For every reaction, there is an opposite reaction
c) The body tends to be rotated if the force is applied tangentially
d) The body is rest until a force is applied

Q.3 The point at which the total area of a plane figure is assumed to be concentrated is called _____
a) Centroid   b) Centre of gravity
c) Central point   d) Inertial point

Q.4 Limiting friction of a body depends on_____
a) Area of contact of surfaces
b) The volume of the smaller body on larger surface
c) Nature of surfaces
d) The periphery of the contact surfaces

Q.5 When a particle moves along a straight path, then the particle has
a) Tangential acceleration only
b) Centripetal acceleration only
c) both tangential and centripetal acceleration
d) none of the mentioned

Q.6 A bottle opener belongs to which class of the levers.
a) Effort in the middle
b) Fulcrum in the middle
c) Resistance in the middle
d) none of the mentioned

Q.7 Which point on the stress strain curve occurs after the ultimate point?
a) Last point b) Breaking point
c) Elastic limit d) Material limit

Q.8 The material in which large deformation is possible before absolute failure by rupture is called_____
a) Plastic b) Elastic
c) Brittle d) Ductile

Q.9 On bending of a beam, Which is the layer which is neither elongated nor shortened?
a) Axis of load b) Neutral axis
c) Center of gravity d) None of the mentioned

Q.10 The longest leaf in a leaf spring is called centre leaf.
a) It is called middle leaf
b) It is called master leaf
c) Yes
d) None of the listed

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SECTION-B

Note: Objective type questions. All questions are compulsory. (10x1=10)

Q.11 Name any two system of units.
Q.12 Give statement of triangle law of forces.
Q.13 What are non-concurrent forces.
Q.14 What is axes of symmetry.
Q.15 Define angle of friction.
Q.16 Define velocity ratio for a simple machine.
Q.17 Write principle of helical spring.
Q.18 What is principle of beam?
Q.19 Define buckling load.
Q.20 Give statement of Hook's law.

SECTION-C

Note: Short answer type questions. Attempt any twelve questions out of fifteen questions. (12x5=60)

Q.21 Differentiate between scalar quantities and vector quantities.
Q.22 What are the condition of equilibrium of forces.
Q.23 Find the resultant of two unlike parallel forces.
Q.24 Describe and explain laws of moments.
Q.25 Locate the centroid of a T-section 10cm x 10 cm x 2cm.
Q.26 State the laws static and dynamic friction.
Q.27 What are laws of motion? Give its application.
Q.28 State and explain law of machine.

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