Q.30 A circular shaft of 60 mm diameter is running at 150 rpm. If the shear stress is not to exceed 50 Mpa, find the power which can be transmitted by the shaft. (CO8)

Q.31 Explain any five mechanical properties of materials. (CO1)

Q.32 Find the minimum diameter of a steel wire which is used to lift a load of 4000 N if the stress in wire is not to exceed 100 $N/mm^2$ (CO1)

Q.33 Define Column. Explain the different types of columns. (CO7)

Q.34 Explain various loading modes. (CO2)

Q.35 What do you understand by hogging and sagging bending moments. (CO3)

## SECTION-D

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

Q.36 Derive the torsion equation for a solid shaft. (CO8)

Q.37 A simply supported beam 5m long is subjected to two point loads of 3KN and 5KN each at a distance of 1m and 3m respectively from the left hand support. Draw the S.F.D and B.M.D for the beam. (CO3)

Q.38 Find the moment of inertia of T section with flange 25 cm x 2.5 cm and web 15 cm x 2.5 cm about horizontal and vertical axis passing through the C.G of the section. (CO4)





Roll No. .....

**1st Sem./ Mech. Engg. (MSIL)**
**Subject:- Strength of Materials**

Time : 3Hrs. M.M. : 100

## SECTION-A

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

Q.1 Hooke's law holds good upto (CO1)
- a) Elastic limit
- b) Plastic limit
- c) limit of proportionality
- d) none of the above

Q.2 Which of the following materials is more elastic (CO1)
- a) Rubber
- b) Glass
- c) Wood
- d) Steel

Q.3 The unit of moment of inertia is (CO4)
- a) m
- b) $m^2$
- c) $m^3$
- d) $m^4$

Q.4 At the point of contraflexure (CO3)
- a) BM is either zero or changes sign
- b) BM is minimum
- c) BM is maximum
- d) None of the above

Q.5 Neutral axis of a beam is the axis of (CO5)
- a) Zero stress
- b) Maximum stress
- c) negative stress
- d) positive stress

Q.6 Rankine's formula holds good for (CO7)

a) Short columns
b) Long columns
c) medium columns
d) both short & long columns

Q.7 The unit of torque in SI system is (CO8)

a) kgm c) $N/m^2$
b) Nm d) $N/M^3$

Q.8 The load required to produce a unit deflection in the spring is called (CO6)

a) Modulus of rigidity c) Spring stiffness
b) Flexural rigidity d) Torsional rigidity

Q.9 The polar moment of inertia of a circular section is about (CO4)

a) X-X axis c) Z-Z axis
b) Y-Y axis d) Neutral axis

Q.10 Which of the following is a dimensionless quantity. (CO1)

a) Shear stress c) strain
b) Poisson's ratio d) Both (b) and (c)

## SECTION-B

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

Q.11 Unit of load in SI system is_____. (CO1)

Q.12 Write the full form of UDL. (CO3)

Q.13 Define proof resilience. (CO2)

Q.14 What do you mean by second moment of area. (CO4)

Q.15 Write the equation for Torsion equation. (CO8)

Q.16 Write the full form of F.O.S (CO1)



Q.17 Point of contraflexure occurs only in _____ beams (CO3)

Q.18 Section modulus of a beam is the ratio of _____ and _____. (CO5)

Q.19 The slenderness ratio of long columns is greater than _____. (CO7)

Q.20 Name the different types of springs. (CO6)

## SECTION-C

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

Q.21 Explain the tensile test on a mild steel specimen. (CO1)

Q.22 Calculate the resilience and the modulus of resilience of a bar 150 mm long, 40 mm wide and 20 mm thick subjected to a tensile load of 40KN applied gradually. Take $E=2X10^5$ $N/mm^2$ (CO2)

Q.23 State and explain Parallel Axis theorem. (CO4)

Q.24 Define beam. Explain various types of beams. (CO3)

Q.25 Write any five assumptions in the theory of simple bending. (CO5)

Q.26 Explain various end conditions in case of columns. (CO7)

Q.27 What is the section modulus of (CO5)
i) rectangular section ii) circular section

Q.28 State and explain Hooke's Law. (CO1)

Q.29 Define spring. State the various functions of springs. (CO6)