**2nd Year /Advance Diploma in Tool and Die Making**

**Subject:- Applied Mechanics & Strength of Materials**

Time : 3Hrs.                                                    M.M. : 100

**SECTION-A**

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

Q.1  Unit of Strain-

a)  $N\text{-}m^2$                           b)  $N\text{-}m^3$

c)  $N/m^2$                          d)  No unit

Q.2  Which of the following is a vector quantity?

a)  Mass                           b)  Time

c)  Stress                          d)  Density

Q.3  Which of the following is a Derived Quantity?

a)  Force                          b)  Mass

c)  Electric Current          d)  Length

Q.4  The forces which meet at one point but their lines of action lies on different planes, are known as

a)  Coplanar concurrent forces

b)  Coplanar non-concurrent forces

c)  Non-Coplanar non-concurrent forces

d)  Non-Coplanar concurrent forces

Q.29  Define -
a)  Define Strain Energy
b)  Proof Resilience

Q.30  Draw Stress-strain curve for a ductile material.

Q.31  State four assumption in theory of pure torsion.

Q.32  A circular shaft of 80mm diameter is required to transmit torque is another shaft. Find the safe torque, which the shaft can transmit, if the shear stress cannot exceed 40 MPa.

Q.33  Explain the following terms:
a)  Strut                    b)  Slenderness Ratio

Q.34  Write the mathematical expression for calculating the deflection in helical springs.

Q.35  Define springs. Also explain different types of springs.

**SECTION-D**

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

Q.36  Find the centroid of an I-section whose dimensions are as under:
Top Flange = 20cm x 5cm
Web Flange = 5cm x 20 cm
Bottom Flange = 30cm x 5cm

Q.37  A cantilever beam of length 8m carries a uniformly distributed load of 4kN/m which runs over a length of 4m from the free end. In addition to this there is a point load of 2kN at a distance of 4m from the free end. Draw SFD and BMD.

Q.38  What is Lever. Explain its principle of operation and derive the expression for its Mechanical Advantage and Velocity Ratio.

Q.5 The moment of force
  a) Measure the capacity to do work
  b) Occurs only when the bodies are in equilibrium
  c) Measure the ability to produce capacity turning or twisting.
  d) None of the above
Q.6 Friction is a/an
  a) Force
  b) Acceleration of an object
  c) Velocity of an object
  d) Property of an object
Q.7 The unit of momentum is same as that of
  a) Energy          b) Work
  c) Force           d) Impulse
Q.8 Mechanical Advantage is
  a) Load lifted X Effort applied
  b) Load lifted/Effort applied
  c) Effort applied/Load lifted
  d) Effort applied - Load lifted
Q.9 The column whose slenderness ratio is greater than 120 is known as _____.
  a) Short Column        b) Long Column
  c) Medium Column       d) Composite Column
Q.10 The Shear Stress is minimum at
  a) Axis of the shaft
  b) Anywhere inside the shaft
  c) Outer surface of the shaft
  d) None of the above

**SECTION-B**

**Note:** Objective/Completion type questions. All questions are compulsory.          (10x1=10)
Q.11 Full form of BMD is _____.
Q.12 Define Pure Bending.
Q.13 Define Open Coil Helical Spring.
Q.14 Buckling load is also known as _____.
Q.15 The efficiency of a reversible machine is always greater than _____.
Q.16 Write the relation between Modulus of Rigidity (G) and Modulus of Elasticity (E)
Q.17 The S.I. unit of Section modulus of a plane figure is _____.
Q.18 The negative bending moment is known as _____.
Q.19 Write Torsion equation.
Q.20 Define Modulus of Resilience.

**SECTION-C**

**Note:** Short answer type questions. Attempt any twelve questions out of fifteen questions.          (12x5=60)
Q.21 State Newton's 2nd Law and 3rd Law of motion.
Q.22 State the laws of Static Friction.
Q.23 State and prove Lami's Theorem.
Q.24 Mention seven fundamental quantities along with their units.
Q.25 Explain the methods of reducing friction.
Q.26 A car of mass 100 kg gets the speed of 20m/s in 10 seconds from 0 velocity. Calculate the force required by the engine to drive the car.
Q.27 State the Theorem of Parallel Axis.
Q.28 State Law of Machine.