# BRAINWARE UNIVERSITY

## Term End Examination 2020 - 21

**Programme – Diploma in Mechanical Engineering**

**Course Name – Engineering Mechanics**

**Course Code - DME105**

**Semester / Year - Semester I**

Time allotted : 75 Minutes Full Marks : 60

[The figure in the margin indicates full marks. Candidates are required to give their answers in their own words as far as practicable.]

## Group-A

(Multiple Choice Type Question) 1 x 60=60

1. *(Answer any Sixty )*

(i) The unit of force in S.I. units is

a) kilogram b) newton

c) watt d) dyne

(ii) The unit of power in S.I. units is

a) newton meter b) watt

c) joule d) kilogram meter/sec

(iii) Forces are called coplanar when all of them acting on body lie in

a) one point b) one plane

c) different planes d) perpendicular planes

(iv) If a number of forces act simultaneously on a particle, it is possible

a) not a replace them by a single force b) to replace them by a single force

c) to replace them by a single force through C.G d) if any number of forces acting at a point E9:J9

(v) A force is completely defined when we specify

a) magnitude b) direction

c) point of application d) all of the above

(vi) The algebraic sum of the resolved parts of a number of forces in a given direction is equal to the resolved part of their resultant in the same direction. This is as per the principle of

a) forces
b) independence of forces
c) dependence of forces
d) Resolution of forces

(vii) Which of the following do not have identical dimensions?

a) Momentum and impulse
b) Torque and energy
c) Torque and work
d) Moment of a force and angular momentum

(viii) Which of the following is not the unit of power?

a) kW (kilowatt)
b) HP (horse power)
c) kcal/sec
d) kcal/kg sec.

(ix) Which of the following is not the unit of pressure?

a) kg/cm2
b) pascal
c) atmospheric pressure
d) Newton.

(x) Which of the following is not a scalar quantity

a) time
b) mass
c) volume
d) acceleration

(xi) A number of forces acting at a point will be in equilibrium if

a) their total sum is zero
b) two resolved parts in two directions at right angles are equal
c) sum of resolved parts in any two perpendicular directions are both zero
d) all of them are inclined equally

(xii) According to principle of moments

a) if a system of coplanar forces is in
b) if a system of coplanar forces is in

equilibrium, then their algebraic sum is zero

equilibrium, then the algebraic sum of their moments about any point in their plane is zero

c) the algebraic sum of the moments of any two forces about any point is equal to moment of the resultant about the same point

d) positive and negative couples can be balanced

(xiii) According to law of triangle of forces

a) three forces acting at a point will be in equilibrium

b) three forces acting at a point can be represented by a triangle, each side being proportional to force

c) if three forces acting upon a particle are represented in magnitude and direction by the sides of a triangle, taken in order, they will be in equilibrium

d) if three forces acting at a point are in equilibrium, each force is proportional to the sine of the angle between the other two

(xiv) If a rigid body is in equilibrium under the action of three forces, then

a) these forces are equal

b) the lines of action of these forces meet in a point

c) the lines of action of these forces

d) (b) and (c) above

(xv) A heavy ladder resting on floor and against a vertical wall may not be in equilibrium, if

a) the floor is smooth, the wall is rough

b) the floor is rough, the wall is smooth

c) the floor and wall both are smooth surfaces

d) the floor and wall both are rough surfaces

(xvi) In actual machines, mechanical advantage is _____ velocity ratio

a) Equal to

b) Less than

c) Greater than

d) None of these

(xvii) Two coplanar couples having equal and opposite moments

a) balance each other
b) produce a couple and an unbalanced force
c) are equivalent
d) Cannot balance each other

(xviii) Center of gravity of a solid cone lies on the axis at the height
a) one-fourth of the total height above base
b) one-third of the total height above base
c) one-half of the total height above base
d) three-eighth of the total height above

(xix) Center of gravity of a thin hollow cone lies on the axis at a height of
a) one-fourth of the total height above base
b) one-third of the total height above base
c) one-half of the total height above base
d) three-eighth of the total height above the base

(xx) On a ladder resting on smooth ground and leaning against vertical wall, the force of friction will be
a) Downwards at its upper end
b) Upwards at its upper end
c) perpendicular to the wall at its upper end
d) Zero at its upper end

(xxi) The phenomena of horizontal pull and push explain what?
a) Theory of friction
b) Theory of relativity
c) Theory of action
d) Theory of forces

(xxii) The C.G. of a right circular solid cone of height h lies at the following distance from the base
a) h/2
b) J/3
c) h/6
d) h/4

(xxiii) What is the S.I unit of work done?
a) Joule
b) Newton meter
c) Both a. and b
d) None of the above

(xxiv) Pick up the incorrect statement from the following :

a) The C.G. of a circle is at its center

b) The C.G. of a triangle is at the intersection of its medians

c) The C.G. of a rectangle is at the intersection of its diagonals

d) The C.G. of a semicircle is at a distance 0.23 mm from its base

(xxv) For making the equilibrium equations the normal forces acts in which direction in the free body diagrams?

a) Vertically Upward

b) Vertically Downward

c) Horizontally Right

d) Horizontally Left

(xxvi) We show the net forces by the help of _____ forces.

a) Rotational

b) Linear

c) Helical

d) Resultants

(xxvii) Which formula is used to calculate angle of static friction (?s)?

a) tan-1?s

b) sin-1?s

c) cos-1?s

d) none of the above

(xxviii) Frictional force encountered after commencement of motion is called

a) post friction

b) limiting friction

c) kinematic friction

d) dynamic friction

(xxix) Pick out the wrong statement about friction force for dry surfaces.
Friction force is

a) proportional to normal load between the surfaces

b) dependent on the materials of contact surface

c) proportional to velocity of sliding

d) independent of the area of contact surfaces

(xxx) A particle moving with respect to fixed frame of reference is called as _____

a) absolute motion
b) relative motion
c) rectilinear motion
d) none of the above

(xxxi) The rate of change of _____ with respect to time is called as jerk.

a) acceleration
b) density
c) displacement
d) volume

(xxxii) There are main two types of forces which are being stated in the free body diagram, they are generally the resultant forces which are being acted over the body. Which are they?

a) Normal and Frictional
b) Normal and Vertical
c) Vertical and Frictional
d) Normal and Fractional

(xxxiii) Dynamic friction as compared to static friction is

a) same
b) more
c) less
d) may be less of more depending on nature of surfaces and velocity

(xxxiv) Force of 150 N moves a body in 5 sec along a straight line according to $x = t3 - 60t$. What is the mass of the moving body?

a) 17.23 kg
b) 15.23 kg
c) 15 kg
d) 5 kg

(xxxv) The algebraic sum of moments of the forces forming couple about any point in their plane is

a) equal to the moment of the couple
b) constant
c) both of above are correct
d) both of above are correct

(xxxvi) If three forces acting in one plane upon a rigid body, keep it in equilibrium, then they must either

a) meet in a point
b) be all parallel
c) at least two of them must meet
d) all the above are correct

(xxxvii) A machine which can take a body from the ground to a definite elevation with the application of smaller effort , can be called as

a) compound machine
b) heavy mahine
c) grouting machine
d) lifting mahine

(xxxviii) In ideal machines

a) Mechanical advantage is greater than velocity ratio
b) Mechanical advantage is equal to velocity ratio
c) Mechanical advantage is less than velocity ratio
d) Mechanical advantage is unity

(xxxix) Pick up the correct statement:

a) The path traced by a projectile is trajectory
b) The area under v-t diagram is acceleration
c) Efficiency of simple machine is velocity ratio / mechanical advantage
d) If efficiency is < 50%, that simple machine is reversible

(xl) Static friction is always

a) Less than dynamic friction
b) Equal to dynamic friction
c) Greater that dynamic friction
d) Has no relation with dynamic friction

(xli) The mechanical advantage of a lifting machine is the ratio of

a) Distance moved by effort to the distance moved by load
b) Load lifted to the effort applied
c) Output to the input
d) none of these

(xlii) A machine having an efficiency greater than 50%, is known as

a) Reversible machine
b) Compound machine
c) Non-reversible machine
d) Neither reversible nor non-reversible machine

(xliii) Coulomb friction is the friction between

a) Two dry surfaces
b) Bodies having relative motion
c) Two lubricated surfaces
d) Solids and liquids

(xliv) The motion of a particle round a fixed axis is

a) Translatory
b) Circular
c) Rotary
d) Both a. and b.

(xlv) If rain is falling in the opposite direction of the movement of a pedestrian, he has to hold his umbrella

a) More inclined when moving
b) Less inclined when moving
c) More inclined when standing
d) Less inclined when standing

(xlvi) The point at which the total area of a plane figure is asssumed to be concentrated is called _____

a) Centre of gravity
b) Central point
c) Mid point
d) None of these

(xlvii) Where the center of gravity of a circle lies?

a) At its centre
b) Anywhere on its radius
c) Anywhere on its circumference
d) None of these

(xlviii) A rectangle has dimension of 10cm x 20cm. where will be its center of gravity?

a) (20,5)
b) (10,5)
c) (5,10)
d) None of these

(xlix) The axis about which moment of area is taken is known as _____

a) Axis of area
b) Axis of rotation
c) Axis of moment
d) Axis of reference

(l) What is the unit of radius of gyration?

a) m4 b) N

c) m d) None of these

(li) What will be the the radius of gyration of a circular plate of diameter 10 cm?

a) 1.5cm b) 2.0cm

c) 2.5cm d) None of these

(lii) _____ is a horizontal structural member subjected to transverse loads perpendicular to its axis.

a) Column b) Strut

c) Beam d) Truss

(liii) Fixed beam is also known as _____

a) Built on beam b) Encastered beam

c) Rigid beam d) Tye beam

(liv) U.D.L stands for?

a) Uniformly diluted length b) Uniformly distributed loads

c) Uniformly developed loads d) None of these

(lv) Moving train is an example of ____ load.

a) Point load b) Cantered load

c) Rolling load d) Uniformly varying load

(lvi) A beam which extends beyond it supports can be termed as _____

a) Over hang beam b) Over span beam

c) Tee beams d) Isolated beams

(lvii) Units of U.D.L?

a) KN-m
b) KN/m
c) KN
d) None of these

(lviii) A simple support offers only_____ reaction normal to the axis of the beam.

a) Horizontal
b) Vertical
c) Inclined
d) None of these

(lix) For a simply supported beam, the moment at the support is always _____

a) Maximum
b) Zero
c) Minimum
d) None of tese

(lx) Hinged supports offers vertical and _____ reaction.

a) Horizontal
b) Rotation
c) Couple
d) None o these